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GENERAL BOARD OF HEALTH.

LETTER

OF THE

PRESIDENT OF THE GENERAL BOARD OF HEALTH,

TO

THE RIGHT HONOURABLE THE VISCOUNT PALMERSTON,

SECRETARY OF STATE FOR THE HOME DEPARTMENT, &c., &c.,

ACCOMPANYING A

REPORT FROM DR. SUTHERLAND.

ON

EPIDEMIC CHOLERA

IN THE METROPOLIS IN 1854.

Presented to both Houses of Parliament by Command of Her Majesty.

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General Board of Health,

My Lord, January 29, 1855.

As cholera has now happily disappeared from the United Kingdom, and the active duties of the General Board of Health in relation to that epidemic have come to a close, I am anxious to lay before your Lordship the steps which have been taken under my direction, in this office, in execution of the duties imposed on the General Board of Health by the Nuisances Removal and Diseases Prevention Acts, 1848 and 1849 (11 & 12 Vict. c. 123., 12 & 13 Vict. c. 111.)

The general relations of epidemic cholera to the various conditions of the population have already been examined in detail, in the report of the late General Board of Health on the visitation of 1849. In this communication I shall confine myself to a statement of the proceedings actually taken under my directions, as introductory to the several reports upon the outbreak of 1854, viz. those about to be made by the Medical Council through its committees, those by the scientific inquirers acting under the Board on the special subjects of their several investigations, that by Dr. Sutherland on the epidemic as it prevailed in the metropolis, and that by Dr. Milroy on the epidemic as it prevailed in the other parts of England, included in the returns of the Registrar-General. All these reports I hope soon to lay before Parliament.

I entered on my duties as President of the General Board of Health on the 12th of August 1854. At this date cholera was rapidly on the increase; the deaths from that disease in the six weeks ending with that day having been successively 1, 5, 26, 133, 399, 644.

On the same day I directed an application to the Treasury for leave to employ two Medical Inspectors. The sanction of the Treasury having been forthwith received, Dr. Sutherland and Dr. Milroy were the same day appointed.

The duty assigned to these gentlemen was, to advise and assist local authorities in the exercise of their powers under the Nuisances Removal and Diseases Prevention Acts, and to

aid me in the performance of my functions under the same Acts which empower the General Board to issue regulations and directions for the prevention and mitigation of epidemic disease.

Finding that those Acts gave me no effectual power to enforce upon Boards of Guardians the execution of these regulations and directions, I determined to do my best by way of urging and aiding the local authorities in their execution. With this view the following circular was the same day issued to all the Metropolitan Boards of Guardians:

"The General Board of Health,
"Whitehall, August 12, 1854.

"SIR,

"I AM directed by the General Board of Health to inform you, that it is the anxious desire of the Board to co-operate with the Metropolitan Boards of Guardians in preventing and mitigating, as far as possible, the visitation of epidemic cholera, which has already made its appearance in many districts of the metropolis.

"While the Board would deprecate any diminution of local responsibility or interference with local efforts, it is possible that their assistance and advice may be acceptable to Boards of Guardians, and they are prepared therefore to direct one of the Board's medical officers to attend and confer with the Guardians in company with an Inspector from the Poor Law Board*, as to the preventive measures already taken or to be taken, and the arrangements for dispensary accommodation and treatment of the sick in accordance with the recommendations in the minute on preventive measures already sent. I am, therefore, to request that you will convene a special meeting of the Guardians for the purpose of ascertaining whether they are desirous of receiving the assistance and advice of this Board in the manner above indicated, and that you will communicate to me the wishes of the Guardians in this respect.

I am, &c.

"To the Clerk of the Guardians. "T. TAYLOR, Secretary."

A detailed account of the manner in which this circular was received will be found in the 1st section of the annexed report by Dr. Sutherland (p. 19 *et seq.*)

As the disease increased in intensity, feeling the want of fuller information as to what local authorities were doing, I appointed six additional Medical Inspectors on the 2d of

* The Poor Law Board had at once offered the aid of their inspectors in any conferences that might arise from this letter.

September, and on the 6th of September I increased that number to ten.

The supervision of the metropolitan parishes and unions affected by the epidemic was entrusted to these gentlemen, and the following instructions were placed in their hands:—

INQUIRIES to be made by MEDICAL INSPECTORS.

1st. The extent of medical relief now existing:—
- *a.* Number of medical officers.
- *b.* Number of day and night dispensaries.
- *c.* Number of house-to-house visitors.
- *d.* Measures for arresting diarrhœa in workhouses.
- *e.* Copies of notices issued by Guardians.
- *f.* Hospital accommodation and houses of refuge.

2d. Extent of the disease:—
- *a.* Number of cholera cases.
- *b.* ,, diarrhœa cases.
- *c.* Deaths from either, under union medical officer.

This information to be obtained for a few days back, and tabulated in one of the returns under the heads of—
1. District medical officers' cases.
2. Dispensary cases.
3. Medical visitors' cases.

3d. Localities affected:—
- *a.* A list of those where cholera or diarrhœa chiefly prevails, and has hitherto or recently prevailed.
- *b.* Visit some of the worst localities; inspect them and the houses; converse with the people, ascertain to what extent diarrhœa prevails, and what cleansing measures, lime-whiting, &c. may be required, and whether there be any Inspector of Nuisances to carry out these measures.
- *c.* Examine the water supply, and ascertain whether it is taken from the river above or below Chelsea reach.
- *d.* Inquire as to nuisances or noxious trades, and inspect them.

4th. Report to the General Board of Health,—
- *a.* On the particulars mentioned above.
- *b.* On the number of additional dispensaries required.

c. On the additional medical officers required.
d. On the additional medical officers required, stating their number.
e. Additional Inspectors of Nuisances, or cleansing staff required.
f. Additional hospital accommodation, or houses of refuge required.

In a few days all the infected districts were under the supervision of the Medical Inspectors, who were in constant communication with the local authorities. They made daily reports to me of the progress of the epidemic, and the measures taken by the Boards of Guardians. These reports I immediately minuted with instructions, and the Inspectors were directed to bring the substance of my minutes under the notice of the local authorities.

The distribution of the metropolitan districts among the Inspectors will be found at the conclusion of the first portion of the annexed report. (p. 25.)

Dr. Sutherland's report itself is an abstract of their separate reports.

Before the Inspectors began their labours, circulars had been prepared and issued from this office in large numbers, informing the public of the proper way of proceeding for the removal of nuisances, pointing out to Boards of Guardians their statutory duties in relation to the epidemic, and setting forth plain and brief precautions to be observed during the prevalence of cholera.

Copies of these are printed in the Appendix (p. 75 *et seq.*).

The late Board of Health, in their last year of office, had compiled and circulated a summary of instructions to local authorities on the organization of preventive measures against cholera.

Fresh copies of these were now distributed, and are printed in the Appendix (page 75 *et seq.*) as revised at a later date by the Medical Council.

The regulations and directions issued by the late Board under the authority of the Nuisances Removal Act, 1848, having expired on the 10th of September, on the 8th and 14th of September new sets of regulations and directions were issued for England,* while those for Scotland, having

* For which see Appendix, p. 112.

been settled in concert with the public and legal authorities in that part of the kingdom, were renewed unaltered on the 8th of September.

These regulations and directions will remain in force for six months from their respective dates.

Meanwhile, though the services of the Medical Inspector enabled me to carry out the administrative medical arrangements which the law directed, I became every day more and more impressed by the necessity of some means by which this department might be enabled to avail itself of the best medical assistance in matters coming within the domain of scientific medical inquiry. With this view it seemed to me desirable that scientific inquiries (chemical, meteorological, and microscopical) should be instituted into the circumstances attending the epidemic, and that a Medical Council should be appointed to act during the prevalence of the epidemic.

The requisite sanction having been procured, a Medical Council (*a*) was appointed, consisting of—

1. †John Ayrton Paris, M.D., F.R.S., President of the Royal College of Physicians.

2. *Sir James Clark, Bart., M.D., F.R.S., Physician in Ordinary to the Queen and to his Royal Highness Prince Albert.

3. *James Alderson, M.D., F.R.S., Fellow and Treasurer of the Royal College of Physicians, Physician to St. Mary's Hospital.

4. *Neil Arnott, M.R.C.P., Physician Extraordinary to the Queen.

5. †Benjamin Guy Babington, M.D., F.R.S., Fellow of the Royal College of Physicians, late Physician to Guy's Hospital.

6. †Alexander Tweedie, M.D., F.R.S., Fellow of the Royal College of Physicians, Physician to the Fever Hospital, Examiner in Medicine in the University of London.

(*a*) Of these, those marked † were nominated by the Royal College of Physicians. Those marked § were selected from a list furnished to the President by the Royal College of Surgeons. Those marked ¶ were nominated by the Society of Apothecaries. Those marked * were nominated by myself.

7. *William Baly, M.D., F.R.S., Assistant Physician to Saint Bartholomew's Hospital, Physician to the Millbank Penitentiary.

8. §William Lawrence, F.R.S., Vice President of the Royal College of Surgeons, Surgeon to St. Bartholomew's Hospital, Surgeon Extraordinary to the Queen.

9. *John Simon, F.R.S., Surgeon to St. Thomas' Hospital, Officer of Health in the City of London.

10. *Richard Owen, F.R.S., Professor of Zoology in the Royal College of Surgeons.

11. ¶Nathaniel B. Ward, Master of the Society of Apothecaries.

12. ¶John Bacot, Inspector of Anatomy, Member of the Senate of the University of London.

13. *William Farr, M.D., Registrar General's Office.

Dr. R. D. Thompson, Dr. Hassall, and Mr. Glaisher were at the same time appointed to conduct, respectively, chemical, microscopical, and meteorological inquiries in connexion with the prevailing disease.

The Medical Council met on the 6th of September, and the following letter, then read, will explain my view of the objects of their appointment:

General Board of Health,
September 6, 1854.

GENTLEMEN,

In opening the first sitting of the first Medical Council that has allowed itself to be associated with this department, it becomes my duty, after thanking you for the public spirit and benevolence you have shown in undertaking this service to the community, to point out briefly both what appear to me to be the general objects in respect of which your assistance and advice will be useful, and the more special and immediate matters to which your attention is invited at present.

I am charged with the responsible duty of directing the sanitary administration of the country, so far as we have as yet anything deserving the name.

But upon scientific matters connected therewith, where the medical profession are to be consulted, advised with, laid under contribution for service or information, or called upon to act, I wish to have the aid of a Medical Council, to whom I may submit questions for consideration, and whom I may ask to suggest or undertake such inquiries as may from time to time be necessary.

The special work of this department is the application of the Public Health Act to such towns as petition for it.

Besides this, in times of epidemic, the Board is charged with the duty of issuing regulations and directions for the prevention, as far as possible, or mitigation of disease.

It will be apparent that it is in connexion with the latter branch of my duties I shall have occasion for your valuable services.

But should public confidence be acquired to this department, should the science of public health take its place among the matters with which statesmanship may properly concern itself, as I believe must sooner or later be the case, a wider field will be opened to this department and to the professional advisers whom it may be able to associate with it.

The circumstances of this country, its wealth and poverty, its great cities with their social extremes of luxury and privation, its aggregation of individuals on the same spots, its multifarious industrial occupations, all point to the duty of studying the effects on life and health of trades, callings and processes, habitations, sites, water supply, sewerage, the adulteration of substances used for food, drink, and medicine, as matters vitally affecting the well-being of the nation.

On many of these subjects I hope it may be in my power at future periods to avail myself of scientific aid, but at present, the matter which most presses is the epidemic now unhappily prevalent in this metropolis, as well as in other parts of the United Kingdom. With this my duty brings me into active and hourly contact, and I should deeply regret if (besides the work this office may be enabled to do at present in aid of local authorities, or when necessary in compelling the observance of the law) I am not able, by your assistance, to deduce from this terrible visitation both facts and lessons which may hereafter be made available. For this end I have the cordial co-operation of the Poor Law Board, the Registrar General, and the Commissioners of Sewers for the metropolis, while, all through the country, the Registration Staff and the Local Boards of Health may render me most useful service. But the most valuable result within my reach at present will be wanting, unless I have your aid in procuring such information upon the concomitants and course of the epidemic as only medical and scientific observation can detect.

Cholera is now very widely prevalent in London; up to the 2d of September 4,070 persons have died of the disease in the metropolis alone. I purpose to direct inquiries into the conditions which attend the presence of the epidemic so far as they can be gathered from meteorological, microscopical, and chemical observation.

The gentlemen who have undertaken to conduct these inquiries are here, and will detail for your approbation what is proposed or has been done.

But besides this I have caused a form to be drawn up, which I propose, with your approval and after it has been settled by you, to

have circulated among all the qualified medical practitioners in London, with a view to determine the number of cases of choleraic disease, the proportion of deaths and recoveries, and the treatment pursued in each case.

The settlement of this return is the immediate object of this meeting of the Council.

I wish also that Dr. Sutherland should state to you what has been done in the way of providing for superintendence of the execution by local authorities of the directions and regulations of the Board, and I shall be much obliged if you would aid me by any suggestion as to other means for this purpose that you may think desirable to be taken.

I have also directed to be laid before you copies of the hand-bills issued by the Board, giving plain advice adapted to the emergency. Any suggestions as to these I shall be thankful for, as indeed for everything that may briefly and clearly inform the public mind, and, while promoting calmness and confidence in the means of prevention, indicate these means in the way best adapted to popular apprehension.

I have, &c.

B. Hall.

I feel deeply grateful to the distinguished members of the Medical Council for the self-devotion with which they have given their powers and their time to the service of the public, in connexion with this Board.

A similar acknowledgment is due to the eminent men who undertook the different branches of the scientific inquiry.

The Medical Council held numerous meetings, and besides revising all the instructions issued by the General Board, in so far as relates to medical matters, they lost no time in preparing forms for circulation among medical practitioners where cholera prevailed, intended to elicit the medical results of their experience as to the epidemic.

The issue of these forms and inquiries has produced a great number of returns, from which the committees of the Council have undertaken to prepare reports, which will be laid before your Lordship, when they are placed in my hands, with the reports of the scientific inquirers, and of the committee of the Council to whom these reports have been submitted.

For the purposes of these reports, and of that in preparation by Dr. Milroy, on the epidemic beyond the limits of the metropolis, it has been necessary to compile voluminous returns from the materials collected in the Registrar General's office, and these are being diligently proceeded with.

In order that the epidemic might be brought under observation in Scotland, on the day after the first meeting of the Medical Council I communicated with the Royal Colleges of Physicians and Surgeons, Edinburgh, and the United Faculty of Physicians and Surgeons, Glasgow. I have to thank these bodies for their ready co-operation. They prepared forms of return for circulation in parts of Scotland visited by the epidemic ; and have undertaken the duty of classifying and arranging the information which it is hoped these returns may elicit.

The report by Mr. George Glover on the epidemic in the common and model lodging-houses in the metropolis has already been presented to Parliament.

It appears to me to afford the clearest proof, both of the effect of good sanitary conditions in warding off the pestilence, and of the possibility of attaining these conditions in even bad classes of existing houses.

I have directed the preparation of a separate report upon the district about Golden-square, which was so fearfully visited by the epidemic. This report I hope soon to be able to lay before Parliament.

I believe there are very few examples of so close and careful a house-to-house inquiry into the condition of a district, as that on which this report is founded. The inquiry was conducted by Dr. Fraser, aided by the voluntary and gratuitous services of Mr. J. M. Ludlow and Mr. T. Hughes. I am glad to have this opportunity of acknowledging the zealous discharge by these gentlemen of a most laborious, painful, and even dangerous duty, undertaken solely from motives of humanity and public spirit.

The ravages of the epidemic, however, were not confined to London. It appeared during the autumn in many parts of the United Kingdom, and in some cases with great severity.

When notice of its appearance in a locality was received at this office, full instructions were at once sent down to the local authorities, both as to their legal duties and the organization by which those duties might most effectually be performed. A list was prepared and kept at this office of gentlemen qualified and willing to act (at the expense of Boards of Guardians) as medical superintendents of districts,* as

* For the duties assigned to these officers, see the Board's instructions (page 83, Appendix).

assistants to or substitutes for parochial medical officers, and as house-to-house visitors.

Many applications for the services of gentlemen in these different capacities were made, and at once attended to. I am glad to be able to state that their services have been found most useful, and have in many instances been specially and gratefully acknowledged by the Boards of Guardians at whose request they have been given.

Several reports have been received from the gentlemen thus sent down by recommendation of this Board, and these have been placed in Dr. Milroy's hands for his use in preparing his report on the epidemic beyond the metropolis. The materials for this report are, I am sorry to say, very much less ample than those which have been at the command of Dr. Sutherland.

In conclusion, I am anxious to point out to your Lordship the principal results which appear to me to follow from the experience summed up in the report of Dr. Sutherland. These conclusions, though deduced from the metropolis alone, are in most respects identical with those at which I have arrived from all the information I have received from other parts of the country upon the sanitary condition of the population, and accord with all previous experience on the subject. The evils enumerated may be regarded in a great measure as general, and as admitting general remedies.

The evidence on the localizing conditions of cholera given in the report of Dr. Sutherland (which is, as I have stated, an abstract of the reports of the Medical Inspectors) points to the following as among the more prominent of the removable causes of zymotic disease :—

1. Open ditches used as sewers.
2. Want of sewers.
3. Badly constructed sewers, accumulating deposits and generating sewer gases.
4. The pollution of the atmosphere in streets and within houses from untrapped gulleys and drains, and from sewer-ventilating openings in streets.
5. Cesspools accumulating and retaining excrementitious matters close to and under dwelling-houses, whereby the air is contaminated and the subsoil saturated with filth.
6. Want of house drainage.

7. Improperly constructed house drainage.
8. Defective paving in alleys, courts, and back yards.
9. The absence of any organized daily system of cleansing, and the consequent retention of house refuse in and near dwellings.
10. Bad water, badly distributed.
11. Recurring nuisances.
12. Unwholesome trades, such as private slaughter-houses in crowded localities, bone boiling and crushing, manure making, and other trades evolving vapours containing organic and other noxious matters.
13. Unwholesome vapours exhaled from the Thames, in consequence of the water being polluted by the sewage of the metropolis.
14. Structural defects of dwelling houses, such as houses built in rows, back to back. Cellar habitations. Neighbourhoods the houses of which are closely packed together, with narrow overcrowded streets, alleys, and courts so constructed as to prevent ventilation. Houses absolutely unfit for human habitation. Filthy, unventilated, and overcrowded houses, let to tenants by the week or for other periods less than a year.

Lastly, and applying to all these,

15. Multiplicity of local authorities, and the want of sufficient powers in such authorities to deal with these evils.

Great as these evils are in London, they are not greater, in comparison to the extent of the metropolis, than in other large cities and towns, and there is not one among them that cannot be remedied if proper steps be taken.

The first and most obvious necessity in the metropolis is to sweep away the existing chaos of local jurisdictions, and to constitute Local Boards of Health for the metropolitan districts, with the most ample powers to deal with the evils described. All the details of local works might be left in their hands, as in towns under the Public Health Act; but as there are questions with which Local Boards could not so well deal, such as the purification of the river, opening main lines of streets, laying down main lines of sewers, water supply, &c., these might be placed under the jurisdiction of a metropolitan Board of Works, as suggested in the report of the Commissioners on the Corporation of London last year.

Of all questions that can come under the consideration of the metropolitan authorities, none exceeds in importance that of water-supply.

That the present supply of the metropolis is defective, both in quality and mode of distribution, is hardly contested. The Water Supply (Metropolis) Act of 1852 will, no doubt, lead to great improvements.

I would submit, on this point, that when the period arrives at which the Act requires that the works for the improved supply are to be completed, an inquiry should be instituted, embracing two points,—

1st. How far the companies have complied with the Act; and

2dly, How far the improvements rendered compulsory by the Act have given to London a supply satisfactory both as to quantity, quality, cost, and distribution.

I have prepared a Bill, framed with a view to supersede the existing Acts for the removal of nuisances.

That Bill is before the House of Commons, and I need not set out its provisions here. They are based on necessities widely and deeply felt, and provide remedies much wanted for most serious evils. That measure is intended to be of general application, and to be in force where the Public Health Act is in operation, as well as where that Act has not been applied. I have also introduced a Bill for amendment of the Public Health Act. It has been framed with a view to supply those defects of the present measure which the experience of six years has brought to light, and to give to communities a means of providing a machinery for their own improvement without the cost, difficulties, and delays which attend the procuring of a Local Improvement Act.

I have the honour to be
Your Lordship's obedient Servant,
B. HALL,
President of the General Board of Health.

The Right Honourable
Viscount Palmerston.

Whitehall, December 30, 1854.

Sir,

In compliance with the request of the President of the General Board of Health conveyed in your letter addressed to me on the 26th October, I beg to transmit the accompanying report on the Epidemic Cholera, as it prevailed in the Metropolis in 1854, embodying an abstract of the reports sent in by the Medical Inspectors who had charge of the different Parishes and Unions.

I am, Sir,

Your obedient Servant,

John Sutherland.

T. Taylor, Esq.,
Secretary,
General Board of Health.

REPORT.

As the Medical Council has been charged by the President of the General Board of Health with the duty of preparing a report on the late Epidemic Cholera, having special reference to scientific inquiries and discussions, it will not be necessary for me to do more, in the present report, than state as briefly as possible (chiefly from the reports of the Medical Inspectors) the extent of the epidemic; the localities principally affected; the more obvious localizing causes of the disease; the measures adopted under the Nuisances Removal and Diseases Prevention Act, and the regulations of the General Board of Health issued under that Act, for mitigating its ravages; with the defects in existing powers and authorities which have been rendered evident by the result of the experience obtained in putting the provisions of the Act in force.

Section I.

The Epidemic, the Localities chiefly affected, and the Steps taken by the General Board of Health.

The epidemic of 1854 is the second outbreak of cholera which has occurred in the metropolis since the epidemic of 1849. In the autumn and winter of 1852, a number of suspicious cases occurred in various districts of the metropolis; and in consequence of this I was directed by the General Board of Health to make a special inspection of the epidemic localities on both sides of the river, and to report on their condition. These reports were printed and circulated for the information of the local authorities.

No deaths from cholera were registered during the month of January 1853. There were two deaths in February; two in March; six in April; one in May; three in June; and eighteen in July. During the subsequent four weeks of the month of August the mortality was 4, 10, 18, and 16. In the four weeks of September the deaths were 7, 16, 29, and 47. During October the epidemic progressed, the weekly mortality rising to 66, 45, 83, and 99. The outbreak reached its maximum on the first week of November, on which week the deaths from cholera were 102, and during the following weeks the mortality fell to 98, 72, 46. In December the deaths declined week by week to 28, 13, 11, and 10, on the week ending the 31st.

During the epidemic outbreak of 1853 the current weekly mortality from diarrhœa, a disease which prevails in the metropolis through

all seasons and temperatures, rose along with that from cholera. It declined with it also, and continued to occasion its usual mortality from the beginning of 1854, until the cholera appeared in an epidemic form in the month of July; the deaths throughout this period varying between 10, the lowest, and 38, the highest number of deaths per week.

During the earlier part of the year 1854, cholera had nearly disappeared, but there were occasional deaths registered. These amounted sometimes to one, sometimes to two a week, while none were registered for several consecutive weeks. The total deaths from cholera from the 1st of January till the 1st of July of the present year amounted only to 16. The cases appear, many of them, to have been aggravated forms of diarrhœa or English cholera, occasionally followed by consecutive fever, but generally continuing for a longer period before death than usually happens with Asiatic cholera.

Sometimes the cases were more rapid in their course. One of the earliest of these rapid cases occurred at Fulham, on the 20th May. In this instance death ensued in 15 hours after the time of attack. The usual interval between seizure and death was from 24 to 36 hours.

The following are the dates and residences of the 16 fatal cases which occurred during the first six months of the present year.

10th January	Periwinkle-street, Stepney	Choleraic diarrhœa.
12th „	High-street, Notting-hill	Cholera infantum.
18th „	Camden Town	Cholera.
28th „	Ship Emma, off Wapping	Cholera.
4th February	Charles Street, Hackney-road	Cholera.
3rd April	Prospect-place, Whitecross-street	Choleraic diarrhœa.
4th „	Hardin's-lane, Woolwich	Cholera.
13th „	Baynes'-row, Amwell	Cholera Anglica.
„ „	Workhouse, Islington	Cholera, consecutive fever.
15th „	Dales'-place, Spitalfields	English cholera.
19th „	Crow-lane, Fulham	Spasmodic cholera.
26th „	Workhouse, Mile-end New Town	Cholera.
27th „	Rich-street, Limehouse	Spasmodic cholera.
8th June	Crown-street, St. Margaret's, Westminster	Cholera.
16th „	Mill-lane, St. Paul's, Deptford	English cholera.
17th „	Cash's-ground, St. Saviour's	Cholera.

These facts prove that the late epidemic, like that of 1849, was ushered in by a number of sporadic cases, scattered over the metropolis before the great outbreak took place.

During the whole of the first six months of the present year, there were a few deaths weekly from dysentery, the highest number being seven.

The mortality from typhus fever varied from 40 to 64 a week during the same period. The highest number of deaths from this disease occurred in the beginning of October, when 88 persons

died in one week. The whole class of zymotic diseases proved fatal to between 200 and 300 persons a week till cholera became epidemic, and the maximum mortality from the zymotic class took place on the week of the maximum mortality from cholera. During that week ending September 9th, no fewer than 2,558 inhabitants of the metropolis died of a class of diseases the ravages of which might be very greatly mitigated, if not prevented, by the adoption of measures for protecting the public health.

Cholera became epidemic in the metropolis early in July. No death from the disease had occurred from the 17th June. But on the 5th July, a female infant, six months old, died of "choleraic diarrhœa," in Belvoir-terrace, St. John's, Westminster, after an illness of 24 hours duration.

This case was followed by a number of fatal cases occurring in various districts of the metropolis.

On the 7th July a child died in South Chelsea. On the 8th there was a fatal case in Rotherhithe, and another in St. George's-in-the-East, in which death ensued in 12 hours. On the 9th a seaman died on board ship off Bermondsey, after 16 hours illness. A fatal case occurred in Marylebone on the 12th, another at Brixton on the 14th, and another in Shoreditch parish on the 15th.

During the ensuing week there was a rapid and progressive increase of the epidemic.

On the 16th July there were four fatal cases in Greenwich, St. George's Southwark, Poplar, and Spitalfields.

On the 17th a death took place in Chelsea, and another in Holborn Union.

There were three deaths on the 18th in St. Pancras, Bromley, and Bermondsey.

There were six deaths on the 19th, one in each of the following places,—Chelsea, Hackney, Hoxton, Limehouse, Battersea, Bermondsey.

On the 20th there were five deaths in Poplar, Lewisham, Lambeth, Whitechapel, and St. Olaves.

On the 21st a death took place in Holborn Union, two at Limehouse, and one at Bromley.

There were seven deaths on the 22d,—one in Limehouse, another in Chelsea, a third in the Savoy, and the remainder in St. George's-in-the-East, Camberwell, Rotherhithe, and one on board the Dreadnought hospital ship.

The epidemic by this time had shown its presence over the whole of the metropolis, and during the week ending the 29th July there were 133 fatal cases of cholera, and 84 fatal cases of diarrhœa. There was a rapid increase of the epidemic in the course of the month of August, and it reached its acmé in the second week of September, almost on the same day on which the epidemic of 1849 occasioned the highest mortality. There was indeed a remarkable similarity throughout in the progress and decline of both epidemics. On the week ending the 9th September there were 2,050 deaths from cholera, and 276 deaths from diarrhœa. The epidemic attained its

maximum in nine weeks, but it declined more slowly than it advanced, for the mortality did not fall to that of the first week of the epidemic until 13 weeks after the maximum period. During the advance of the cholera, there was a corresponding increase of the mortality from diarrhœa. Both forms of the epidemic attained their maximum mortality at the same time, and both declined together.

Table I. in the appendix gives the weekly statistics from the beginning of 1854 till the decline of cholera. Assuming the 1st of July as the commencement of the epidemic and the 16th December as its termination, the following table will represent the total mortality from cholera, diarrhœa, typhus, and other zymotic diseases, as contrasted with the mortality from all causes.*

Deaths.				
Cholera.	Diarrhœa.	Typhus.	All Zymotic Diseases.	All Causes.
10,675	2,601	1,347	19,413	40,599

Although there were deaths from cholera over the whole of the metropolis, the mortality was very unequally distributed.

On the north side of the Thames among a population of 1,745,701 (at the last census) it was 4,948, or one death from cholera to 353 inhabitants, while on the south side of the river the deaths out of a population of 616,635 amounted to 5,729, or in the proportion of one death to every 108 inhabitants. The mortality on the south side was thus above threefold, in proportion to the population, what it was on the north side of the river.

The mortality in the districts north of the Thames was by no means equally distributed, but was generally speaking greatest on the lowest levels, with one marked exception, namely, the virulent outbreak of cholera in part of the parish of St. James, Westminster, which I shall make the subject of a separate report.

Table II. in the appendix gives the population and deaths from cholera during the epidemics of 1832, 1849, and 1854 for each parish and union of the metropolis. This table exhibits a considerable variation in the relative mortality of the two last epidemics in the same districts; and making every allowance for partial local improvements, it confirms the observation made during the epidemic of 1848–49, namely, that although localities presenting certain defective sanitary conditions are the special seats of cholera, such localities sometimes escape, or are not always attacked with equal severity.

The facts now stated will account for the greater attention which the General Board of Health directed to certain parts of the

* Besides the deaths from cholera given in the table, there were 3 deaths registered on the week ending December 23d, and 2 deaths on the week ending the 30th. The total mortality from cholera during the year 1854 was therefore 10,696.

metropolis than to others, and in doing so the Board was guided by the experience of former epidemics, which in the main has been confirmed by the experience of the one which has passed away.

I next proceed to state the steps taken by the General Board of Health.

In consequence of the severe outbreak of epidemic cholera in Newcastle-on-Tyne in the month of September 1853, an Order in Council was issued on the 15th of that month, putting in force for six months the Diseases Prevention Act, and authorizing the General Board of Health to issue rules and regulations for the mitigation of the epidemic.

These regulations were issued on the 20th September and 12th October 1853, and sent with an instructional letter to all the parochial authorities in the kingdom. The order in Council was again renewed on the 18th March 1854, and the regulations were re-issued on the 24th of the same month.*

By these regulations the local authorities were directed to carry out such sanitary measures of a temporary nature, as might remove the more obvious localizing causes of epidemic disease.

They were directed to prepare lists of epidemic localities in their parishes or unions; to cause these localities to be examined; to take steps for placing them in as healthy condition as possible by enforcing the removal of all accumulations injurious to health; to see to the cleansing of streets, courts, and alleys, the cleansing, lime washing or fumigating of filthy or infected houses; and they were also directed to provide places of refuge to which persons might be removed from infected houses or neighbourhoods.

The Guardians of the poor were further required to provide sufficient medical attendance for the sick, to open dispensaries for the gratuitous distribution of medicines, and to employ house-to-house visitors for the discovery and treatment of cases of cholera and diarrhœa, which might otherwise prove fatal through personal neglect.

At the end of last and the beginning of the present year Dr. Milroy was requested to re-inspect the worst portions of certain parishes in the metropolis, and to communicate personally with the local authorities as to the propriety of instituting precautionary measures.

The General Board of Health followed up these proceedings by drawing out and circulating among the local authorities a minute of instructions, (subsequently revised and confirmed by the Medical Council,) in which a most careful detail was given of every step required for protecting the public health and for saving life. The proceedings to be taken for improving the sanitary condition of epidemic localities were given step by step. The whole plan of organizing the medical relief of affected parishes was laid down with precision, and it was anticipated that very little interference on the

* A new set of regulations, containing in the main the same provisions, though in a briefer form, were issued by the President of the present Board on the 8th and 14th Sept. following.

part of the Board with the proceedings of local authorities would be necessary in future.

Such was the position of matters when the constitution of the General Board of Health was changed by the Act of last session.

The President of the newly-constituted Board came into office on the 12th of August, and finding that the epidemic by that time was progressing rapidly, he on the same day issued a circular letter to all the Boards of Guardians of the metropolis offering the assistance and advice of the Board through its Medical Superintending Inspectors to any Boards of Guardians who might require it.

To this circular a number of replies were sent in. Several Boards accepted the offer of advice; a number of others gave unsatisfactory accounts of their proceedings; several declined assistance on the ground that they were doing all that was necessary, and from some Boards no answers were returned.

Of the few Boards who accepted assistance the majority were not those of parishes which suffered much from the epidemic, and in one or two instances of severely affected parishes, the advice asked for and given was not acted on.

The epidemic during this period continued to advance rapidly, and seeing that there was no appearance of any efficient measures for protecting the public health of the metropolis being in operation, the President determined to appoint a number of Medical Inspectors to visit all the parishes most severely affected, and to inquire what really was being done. This was on the 31st August, and on the 2d September the inquiry was commenced.

A circular was sent to the vestry clerks of the parishes requesting that meetings of Guardians might be held at a time specified to receive the Inspectors, the notice being as short as possible. Lithographed instructions were put into the hands of each Inspector, by which he was directed to make inquiry as to the extent and efficiency of the preventive measures in each parish as laid down in the Regulations and Instructional Minute of the General Board of Health. He was to visit the infected localities and inquire into the local causes which might appear to have determined the outbreak of the epidemic. He was to see whether the cleansing and removal of nuisances required by the regulations had been done; whether there was sufficient medical attendance for the sick; he was to urge in the strongest manner the necessity of medical house-to-house visitation being carried out, and a sufficient amount of dispensary relief being provided. He was also to see whether proper houses of refuge and hospital accommodation existed, and whether all of the measures of relief in the affected districts had been duly organized. The Inspector was also instructed to report any deficiencies in the existing arrangements, and such additions and improvements as might be requisite. One special head of the inquiry was to ascertain the state of the water supply in the southern districts of the metropolis, on account of serious complaints having been made against it. The work was done so quickly, that in four days the whole of most infected districts of the metropolis were placed under

the supervision of Medical Inspectors. Each Inspector was directed to report as soon as possible, and day by day.

The reports were sent in to the President generally every day, who immediately minuted his instructions on the back of each report, and directed the Inspector to return to his district and to state the wishes of the President to the local authorities, urging them at the same time to adopt the steps required for saving the lives of the people.

The object of the entire procedure was to aid the local authorities without interfering with their freedom of action, and to lead them to fulfil the obligations imposed on them by the Statute without resorting to any attempts at compulsion by means of provisions under which the President was advised that the directions could not be enforced.

These minute proceedings were continued from day to day as long as the severity of the epidemic appeared to render it necessary, and in cases where the authorities would not do their duty, the President directed the Inspector to call for inquests on the bodies of any persons who had died from neglect. In a number of instances this course had to be threatened to secure compliance, but in only one case was it taken. This happened in Clerkenwell, where several lives had been sacrificed in consequence of neglect of the Board's regulations.

The following were the arrangements of parishes under the different Inspectors:—

Dr. Hassall - -	Lambeth.
	Wandsworth Union.
Dr. Headlam Greenhow -	St. Mary, Newington.
	St. George the Martyr.
	St. Saviour's, Southwark.
Mr. Walsh - -	Bermondsey.
	St. Olave's.
	St. John and St. Margaret Westminster.
Dr. Mortimer Glover -	Rotherhithe.
	Greenwich Union.
Dr. Macloughlin -	Stepney Union
	Poplar Union.
	St. Andrew, Holborn.
	St. Giles & St. George Bloomsbury.
Dr. Richard King	Shoreditch.
	Whitechapel.
	St. Luke's, Middlesex.
	Hackney.
Mr. George Glover	Bethnal Green.
	St. George-in-the-East.
	Islington.
	Clerkenwell.
Mr. Patterson - -	The Strand Union.
	St. James, Westminster.
	St. George, Hanover-square.
Dr. Fraser -	Chelsea.
	Paddington.

Some slight alteration in these districts was made to suit circumstances. Part of Dr. Fraser's district was transferred to Dr. Greenhow, in consequence of Dr. Fraser having been directed by the President to undertake a special house-to-house inquiry into the circumstances connected with the violent outbreak of cholera in part of the parishes of St. James Westminster, and St. Ann Soho. Dr. Hassall also visited Fulham, and inspected the parish of St. Martin's-in-the-Fields. In addition to these arrangements for the inspection of the parishes, Dr. Gilbert King, Inspector of fleets and hospitals, was directed to inquire and report on the state of the river and shipping, with the view of organizing suitable measures for the treatment of the premonitory stages of cholera on board ship.

It was not considered necessary at that time to institute any inquiry by inspection within the City of London, or in the large parishes of St. Pancras or Marylebone, because the epidemic had visited them with comparative lightness, and moreover the President had reason to be satisfied with the activity of the local authorities and with the proceedings taken by the local sanitary committees.*

At a later period Mr. Walsh was directed to visit these parishes, and reported favourably on their arrangements for meeting the epidemic in its then intensity. Reports of a similar nature were received respecting the parishes of Islington, Hackney, St. George Hanover Square, and Paddington; and hence the attention of the Inspectors was mainly directed to the parishes where the disease was most prevalent. I had myself previously met the Guardians of Kensington and Fulham, who agreed to carry out the necessary measures of precaution.

Besides the inquiries connected with the sanitary condition of affected districts, and the measures of protection in operation, the Inspectors were also directed to report any instances of improved sanitary arrangements they might meet with in their districts, and the effect of those improvements on the health of the inhabitants.

The Inspectors' reports on the whole epidemic in the metropolis being now before me, I shall next present as brief an abstract of them as possible, arranging the materials regarding all the parishes under a few heads.

Section II.

Sanitary Condition of Localities affected by Cholera and Diarrhœa.

All the inspectors agree in stating as the result of their experience that in those districts where cholera had become localized, they found it connected with obvious removable causes.

The chief place among these local causes is assigned to the state of the drainage, especially in the flat, low-lying districts south of the

* The voluntary exertions of the Local Board of Health of Regent-square church district, St. Pancras, headed by the Incumbent, are worthy of the highest commendation, as affording an example of how much good may be accomplished, even in the present defective state of the law, by vigilance and well-directed effort.

Thames, and in part of Chelsea and Fulham. In all of these parts of the metropolis, there are large masses of population dependent for their drainage on open ditches, tidal ditches, old badly constructed sewers, and still worse house drains, the result of the whole being that the excreta of a large part of the metropolis are not conveyed away, but are left to putrify and rot in the open air, in cesspools under houses, or in large underground sewers, always generating foul gases, which are poured out into the streets, or into the houses, while in the more open districts, the exhalations from the ditches keep the atmosphere in a constantly malarious condition.

Open Ditches.—The reports of the Inspectors contain numerous illustrations of the effect of these causes in predisposing the people to attacks of cholera; and it is worthy of remark, that the exhalations from open ditches, so much complained of at the present time, occupied a prominent position among the causes to which in former days the sweating sickness was attributed.

In describing those which traverse the Borough and Newington, Dr. Greenhow says,—

"The tide flows for several miles up some of these ditches bearing with it the excreta of the inhabitants of the lower district, but carrying with it, in its recession, only a small proportion of the noxious substances it meets in its course, the greater part remaining in the form of black organic mud, which is exposed by the ebbing of the tide for many hours daily to the influence of the atmosphere.

"It is by no means surprising that such a district should be one of the unhealthiest in London, that fever should there find a permanent resting-place, and that pestilence should select the locality as one of its most favorite haunts."

The following illustrations of their effects on the public health are given:—

Great Western-terrace, Kensall New Town, consists of ten or twelve cottages with gardens in front. There was no apparent cause of disease in this case, except that in front of the houses runs an open ditch passing into an open sewer. A good deal of diarrhœa, and several deaths from cholera, took place in these houses.

Dr. Fraser mentions an instance, in this same district, of five deaths having taken place in three houses. Behind one of those houses ran a foul ditch which receives the drainage of a number of privies. In a cottage nearest this ditch two persons died. The remaining three deaths were those of labourers living at a greater distance from the ditch, but who had worked in the field through which it passed. They had all complained greatly of the stench from it up to the time of their being taken ill.

Open ditches, used as sewers, are common in all the parishes that were under Dr. Greenhow's inspection.

He says, "wherever these ditches are used as sewers, more or less "cholera appeared in any houses sufficiently near to be affected by "the exhalations, and it was remarkable to observe the inhabitants "of the neighbouring streets visited by the epidemic in nearly exact "proportion to their proximity to the ditch."

One of these open tidal ditches runs behind Bath-terrace, Newington. All along the course of the ditch cholera has been prevalent.

Running parallel with this ditch is Devonshire-place, containing 16 houses and 114 inhabitants. Of this number 12 persons had cholera, and six died, while 68 of the remaining inhabitants had diarrhœa. All the cholera cases, and nearly all the diarrhœa, took place in the houses abutting on the ditch.

A similar stagnant ditch passes behind Clandon street. In five consecutive houses nearest the ditch, containing 30 persons, 10 had cholera and nine died.

These ditches are constant sources of typhus, in houses in their vicinity, and "a continual cause of parochial expenditure." Their injurious influence is stated to be "in direct proportion to their stag-"nancy, the smaller and more sluggish branches being infinitely more "noxious than the larger."

The parish of Fulham suffered severely from its open ditches.

Dr. Fraser, who examined into the causes of the fatal outbreak of cholera in Camberwell Workhouse, in addition to causes connected with the building itself, lays particular stress on the sanitary condition of the locality in which the workhouse is situated, and the vitiation of the air in the district by emanations from open ditches, piggeries, and other nuisances. He says there are not only local causes "enough to account for the outbreak of cholera, but to create "surprise that malignant epidemic disease should ever be absent from "the district." These foul ditches "traverse the neighbourhood in all directions, receiving the contents of the open privies." A street, called Harris-street, skirts one of them. This ditch receives privy soil and other refuse matter, and also the blood, dung, washings, and no small portion of the offal of a large slaughter-house. The blood from the slaughter-house coloured the ditch to a considerable distance, and the smell from it was most offensive. The people in Harris-street are generally obliged to keep their doors and windows shut in consequence of the stench. In that street, which consists of 20 houses, there were a large number of cholera cases, and in several of the houses there were two, three, or four deaths from the epidemic.

In this and some neighbouring streets, about 50 houses are dependent on a solitary pump for their water supply. This pump is sometimes dry, and the people are "days without water."

Structural Defects in Streets and Houses.—Dr. Greenhow, in describing the general sanitary condition of the houses in the districts under his inspection, states, that a great evil in these districts is, a total absence of any comprehensive plan of laying out ground for building purposes, and the neglect consequently of all arrangements for ensuring a free circulation of air round dwelling houses, and the existence of numerous narrow overcrowded courts and alleys, many of them mere *cul de sacs*. In one such court 12 per cent. of the inhabitants died of cholera in a few days, and most of the survivors had to be removed.

Another great evil is the existence of so many houses built back to back, with doors and windows only in front; with a dead wall behind, and no means of thorough ventilation. These houses are a constant cause of disease.

Dr. Hassall has made a similar complaint as to these back to back houses.

In all the poorer class of dwellings the means of ventilation are described as defective in the highest degree, and much disease and poverty result from the defect. The improvements already completed in dwellings for the labouring classes, show that the ventilation may be made sufficient even in the worst class of cottage property.

Cellar dwellings are stated to be still in use in many parts of the metropolis, contrary to the provisions of the Metropolis Buildings Act, 1844, as appears from the Parliamentary Paper No. 10, dated 14th December 1854. They ought to be abolished forthwith.

The smaller and poorer streets and courts are generally kept in bad repair. The gutters are stated to be badly constructed, and to retain foul water before the doors of the houses. The pavement of courts and alleys is in general very defective.

Mr. George Glover directs special attention to the condition of the dwellings in cholera localities. He describes the accommodation as wretched and confined; the houses overcrowded, ill ventilated, and badly lighted; the privy accommodation deficient; and the houses themselves intermingled with private slaughter-houses, cow-houses, stables, pigsties, and public privies.

Cleansing.—The wide open thoroughfares in the cholera localities are generally, though not always, well swept. The narrow back streets are very imperfectly cleansed, and the courts and alleys "entirely neglected at ordinary times."

Dr. Greenhow states that, in his districts, there appears to be no organized system for removing house refuse, and it hence accumulates in the back yards of the poorer class of property, so as to be injurious to health. The poor complain bitterly of neglect in this particular.

Mr. George Glover says that "the general paving and cleansing of the parish of *Bethnal Green* are very bad." They are both entrusted to one Inspector, who has various other duties to perform, and both are "sadly neglected."

Dr. Hassall states that the cleansing in some parts of Lambeth parish is so ill attended to, that for a period of nearly two months there was no dust contractor, and that in many cases the dust, along with refuse organic matter of all kinds, was not removed for several weeks during the prevalence of the cholera.

He states, also, his opinion that the legal process for abating nuisances is too tedious during the prevalence of a severe epidemic, and that some more summary method is required.

He states, that it has frequently happened that nuisances which the Inspectors have taken in hand at the commencement of the out-

break of cholera have not been removed until after the epidemic has ceased in the neighbourhood.

Sewerage.—The Inspectors agree in stating that the sewerage of all the localities is in a most imperfect condition. Many streets are unsewered. In others the sewers are imperfectly constructed, and become choked up with deposit which evolves the most noxious exhalations. Dr. Greenhow gives the following illustration of this fact.

"Dr. Jones, a member of the St. Saviour's Board of Guardians, informed me at one of the meetings that a bad smell from a sewer close to his surgery having caused much annoyance, he made application for its cleansing. That although the original capacity of the sewer had been considerable, a waterway of six inches only was open, and that 200 loads of soil and mud were removed from the sewer in the space of a very few yards."

It is also stated by Dr. Greenhow that a new sewer had recently been constructed in Guildford-street, St. Saviour's, but that the old one, which was nearly choked up, had been left pretty much in that condition. This old sewer runs under the foot-pavement on the north side of the street, and out of 22 deaths from cholera in that portion of the street, 14 took place in the houses on the north side, close to the old sewer.

Another great sanitary evil, incident to the districts south of the river, is stated to be the reflux of the tide through the sewers at high water.

In some parts the tide fills the sewer and rises in the gully grate up to the level of the street, having previously forced the sewer gases into the public streets, or through the drains into dwelling-houses.

Not unfrequently the basements of houses are flooded from the same cause.

The sewer water so pent up is forced through the sides or openings of the sewer into the sub-soil, and produces malaria over large districts, the effect of which, Dr. Greenhow says, is shown by the marks of miasmatic poisoning in the countenances of the inhabitants.

Dr. Greenhow adduces evidence of medical practitioners and members of Boards of Guardians, to show that house drains are often not trapped, and that disease is produced by sewer gas passing into the houses. Want of trapping is said to arise frequently from surreptitious connexions being made between the house drains and sewers by unskilful persons, and thus the advantages of drainage are converted into direct causes of disease.

The method of ventilating sewers by untrapped gulley grates and open grates in the middle of the street, is condemned as directly injurious to the public health, and many cases of cholera both during the late and previous epidemic are stated to have occurred near these apertures. So long as the present imperfect sewerage exists, some efficient system of ventilation is absolutely necessary.

Dr. Greenhow describes the present system of ventilation by street gratings as "most pernicious."

Dr. Hassall states, that the drainage in the districts under his inspection is very defective, many streets and roads being without any sewers; that the sewers in most cases do not empty themselves properly of their contents, but allow of their deposition and accumulation. Until these evils can be remedied, he conceives that some means of removing the unwholesome gases continually generated from the sewers are indispensably necessary.

Mr. George Glover states that in all the parishes under his inspection the sewerage is bad, and in fact in the greater portion of some of them there are no main sewers at all. The general deficiency and defective nature of the sewerage and house drainage of the narrow streets are notorious.

House Drainage.—Dr. Greenhow appears to have taken considerable pains to estimate the effect of the present condition of the sewerage and drainage of the metropolis in predisposing to cholera. He states, that it is difficult, where so many causes of insalubrity exist, to decide which is the most powerful in localizing the disease; that he directed his most earnest attention to the subject, and that whilst admitting that bad water, improper food, want, fatigue, depressing passions, bad health, and especially the existence of other diseases, powerfully predisposed individuals to attacks of cholera, the effluvia arising from collections of night-soil were by far the most influential. In certain cases, the atmospheric contamination arising from noxious trades appeared to have proved injurious, but, in by far the larger number of cases, direct vitiation of the air by open privies or by drains was obvious. The occurrence of disease from these latter causes, he states to be exceedingly common in the cottages both on the south side of the river and at Chelsea.

"The privies are most commonly untrapped, and placed over cesspools, or drains which seem to act as such." The privies are "most frequently situated in an extremely small back yard, often "built against the main wall of the house or wash-house, through "the foundations of which, after a time, the night-soil percolates, "until it penetrates into the sub-soil below the living apartment," or the privy is within three or four feet of the back door. Sometimes untrapped privies are actually situated inside houses. Where a privy has been common to a number of houses, it has repeatedly happened, that the occupants of the house situated nearest to it have alone suffered from the pestilence.

The effect of exhalations from badly constructed sewers was also observed to be highly injurious. Houses, in all other respects clean and wholesome, have suffered from the entrance of the sewer gases through untrapped drains and sinks. "In a great many cases, open "gully-holes in the streets have exercised a like baneful influence on "the internal air of houses."

"Sometimes ruinous drains pass close to the walls of houses, and the effluvia from them, penetrating through chinks into the basement, rise from thence by the interstices of the floor to the apartments above."

Mischievous Results of Drains passing under Houses.—The passage of drains underneath houses is stated by Dr. Greenhow to be a not less fruitful source of mischief. "Even when well constructed, this "is a great evil, as the slightest imperfection in the joining of the "pipe may lead to the most disastrous consequences." This is still worse when drains are roughly made of bricks, often only covered by flags or by the boarding of the floor. Houses drained in this defective manner entail "continual ill health among their inmates, with almost "the certainty of the cholera should it arrive in the district."

As an illustration of the effect of these causes of disease, Dr. Greenhow states the following facts:—

In Suffolk-street, in the Borough, there were deaths from cholera in 20 houses. In these houses, up to the 23d September, there had been 29 cases of cholera, and at least as many of diarrhœa requiring medical treatment, and 24 deaths. Not far from these houses, there are bone-boiling establishments, cat-gut manufactories, knackers' yards, the smells from which were much complained of, and besides the smells, no other cause of disease could be detected in three out of the 20 houses. In 11 houses there were untrapped sinks or privies, either within or in such close proximity to the houses as to pollute the air indoors. In one house there was a watercloset on the first floor communicating with a cesspool underneath the shop. In another, there was a cesspool for house-slops in the back area, covered with boards, and a contrivance to pump the liquid up into the yard, from whence it ran into the sewer. In another case, a brick drain ran beneath the house; the privy in the back yard was exceedingly offensive, and there were two untrapped sinks. In one house the privy was built against the kitchen wall, and the yard was undermined by rats so as to afford free egress to the effluvia from the drains. In another case, there was a most offensive untrapped gully immediately in front of the house. It is remarkable that the inhabitants themselves had, with few exceptions, overlooked these local causes of disease, and attributed the cholera solely to the unwholesome trades. Dr. Greenhow examined a number of houses in Suffolk-street, in which there had been no illness, and found their sanitary condition good.

The outbreak of cholera in Lant-street is referred by Dr. Greenhow to similar causes. There were deaths in 12 houses. In these houses there were about 100 inhabitants, of whom 19 had cholera, and above 20 others diarrhœa; 16 out of the 19 cholera cases proved fatal. In this instance, also, the drains passed beneath several of the houses. In one house, a foul and offensive privy was built against the kitchen. In another there is an untrapped sink close to the back door. In the other houses there were similar unhealthy conditions.

Another instance is given of four houses in Swan-street, in three of which the drains passed beneath the houses, occasioning nuisances and producing fevers among the inmates. These houses suffered from cholera and diarrhœa, but the fourth house, the drain from

which did not pass beneath the floor, escaped the epidemic altogether.

Both inhabitants and proprietors expressed a strong desire that this most injurious and dangerous manner of draining should be discontinued, and the sullage removed without passing under the houses.

These illustrations are taken, not from the worst streets or houses, but from the dwellings of respectable tradespeople in comfortable circumstances.

Privies and Cesspools.—Numerous examples of the dangerous results of effluvia from open privies in the small yards of cottages came under Dr. Greenhow's observation, from which the following instances are selected:—

In a house in Down's-buildings, Christ-church, two cases of cholera took place, one of which was fatal. There was an open privy, so situated that the effluvia permeated the house.

Two deaths occurred in a house in Queen Charlotte-court, St. Saviour's. This house had an open privy entering from the bed-room.

In a house in White Hind-alley, in the same neighbourhood, inhabited by three persons, the privy was situated under the same roof as the house. Two of the inmates suffered, one from diarrhœa and the other from cholera, which proved fatal.

Close to a house in Moss-alley, St. Saviour's, there is situated a foul and offensive privy, and a sewer passes close to the wall of the house. Three persons in this house died of cholera.

Great Bland-street, Newington, is a broad, airy, good-looking street, inhabited by respectable people. One of the houses is of a superior class, clean and unexceptionable, but it has an open privy over a cesspool, built against the kitchen wall. There is no drainage, and most of the cesspools in the neighbourhood were overflowing. The house in question was inhabited by five inmates, four of whom died of cholera.

A house in Lombard-street, St. George the Martyr, had its drains choked and offensive, with a foul privy opposite the back door. Two children, who occupied a room overlooking this privy, died of cholera.

There is a house in Swan Court, in St. Mary, Newington, against the gable wall of which there are several privies erected. Two persons in this house died of cholera, and two others had diarrhœa. In this instance, it is said that the soil from the privies had percolated through the wall, and infiltrated the earth below the flooring of the house.

A single death from cholera took place in White-street, in the Borough. This house had a watercloset within three feet of the back door, underneath which there is a large cesspool, receiving the drainage of several other houses, and the smell at times is overpowering.

In a small market garden, by the side of Kensall-road, Kensall-green, is a cottage, well isolated from every other dwelling. There is

no cause of disease near it, except an open privy, with a cesspool constantly full, immediately behind the house; and there is a rude brick drain passing underneath the cottage, and conveying the overflow from this cesspool to another in front, where it is collected for manure. Of four adults inhabiting this cottage, one had diarrhœa, and three were seized with cholera, of whom one died.

Manor gardens, Chelsea, is a large open unpaved court, which has been lately drained. Some of the houses are provided with water-closets, and others have the privy connected with the drain.

There was a good deal of diarrhœa in the court, and also one case of cholera, and that not a fatal one. Every inmate of the house where this case occurred, seven in all, had diarrhœa, and this house is the only one in the court which has a cesspool.

The absence of house drainage, Dr. Hassall found to give rise to a very great evil in the houses of the poorer classes in the districts under his inspection, namely, the use of cesspools and open privies. Both of these are often overflowing, and the stench from them pervades the whole house, and indeed he says, "the air of whole streets and courts is often polluted by the emanations."

They are also a frequent cause of the contamination of shallow well water, especially in suburban and rural districts.

Among the prominent local causes of disease in Bermondsey, Mr. Walsh mentions the house drainage and sewerage as being very defective, owing mainly to the low level of the district and the necessity for damming up the sewers and ditches, except during a low state of the tide. While this defect exists, complete structural arrangements for sewerage or for general house drainage are impossible, and partial changes that have been adopted, such as filling up cesspools without sufficient water being laid on to cleanse the drains, have sometimes been complained of as of doubtful efficacy.

Predisposing Effect of Sewer Gases.—The effluvia from deposits in badly constructed sewers, escaping through openings into public streets and houses, are amongst the most obvious predisposing causes of cholera. A few examples of this will suffice.

Dr. Greenhow states that in Crump's-yard, Chelsea, containing several houses, there is one immediately opposite an open gully; three persons out of four residing in this house were seized with cholera, and two died.

In First-street, Chelsea, are two houses, at a distance from each other, opposite each of which there is an offensive gully grate. Diarrhœa was prevalent in the street, but there was no cholera, except in these houses. In one of them there were eight or nine cases of diarrhœa, four cases of cholera, and two deaths; and in the other, there were two deaths from cholera, and several cases of diarrhœa.

Dr. Fraser gives the following illustration of the injurious effects of emanations from a large offensive untrapped gully opposite New-terrace, Camberwell green. "In the house, No. 6, immediately facing "this gulley, two deaths from cholera have taken place. In the adjoin-"ing house two patients are now ill with this disease, and one has "recently recovered from it in a house a few doors off."

Dr. Greenhow also mentions a case of a respectable woman being carried off by cholera, from accidently inhaling the effluvia arising from a gully near St. George's Church, in the Borough.

A fatal case of cholera, and several cases of diarrhœa took place in a house in Garden-row, Southwark, opposite the door of which is an untrapped gully grate, to which the inmates directly traced the disease.

Five persons residing in East-place, also in the Borough, were all attacked with diarrhœa; and one of them died of cholera. The assignable cause in this case also was an offensive gully grate opposite the door.

Dr. Greenhow states that similar facts came continually under his notice in every portion of his district.

Noxious Trades.—The influence of noxious trades and nuisances in predisposing to attacks of cholera has been observed during the late epidemic.

Dr. Greenhow says, that complaints of these trades were very early made to him in the Borough, "and there can be no doubt," he says, "that the insalubrity of the district is much increased by their being conducted in the midst of a thick population." Dr. Greenhow met with several cases of fever in streets near the premises where unwholesome trades are carried on, and "typhus, or some other fever is rarely absent."

The following example is given by Dr. Greenhow, from the Borough. It is that of a dustman's yard, not far from Essex-street, St. Saviour's, in which there are always many hundred cartloads of dust, road-scrapings, and also night-soil. Close to this depôt is Devonshire-square, containing 22 houses and about 130 inhabitants. The place is clean, and there are no local causes connected with the houses themselves sufficient to account for the attacks of cholera which took place.

The people complained greatly of the nuisance from the dust yard. A large proportion of the inhabitants had diarrhœa; there were about twelve cases of cholera, eight of which proved fatal. A family removed from the square and another family took the house. Three of the members of this new family immediately took cholera, and one died. A good many cases of cholera and several deaths took place in each of the other streets round the dust yard.

Another similar instance of the injurious effect of a contractor's yard in the Borough is also given.

The effluvia proceeding from filthy stables, cow yards, and pigsties are cited among the aggravating causes of the epidemic, and instances are given of whole families, exposed to their influence, having been attacked by cholera and diarrhœa, some cases terminating fatally.

Mr. George Glover says that in the parish of St. George-in the-East there are "noxious trades in full operation, and much complained of by the inhabitants and medical men." There are 2 bone-boilers, 2 oil-boilers, 3 soap makers, 4 or 5 sugar refiners re-burning animal charcoal, 1 naphtha distillery, 4 water-proofing works, 1 candle maker, and 1 place where putrid fish are boiled. One of the worst of these

nuisances was abated by the simple expedient of passing the fumes through a furnace.

Dr. Hassall states that the chief noxious trades in Lambeth district are five bone boilers and crushers, a glue manufactory, and a dust contractor's yard on Belvidere wharf, where there is at all times an enormous collection of organic matter, including sometimes night soil, from which most offensive smells proceed.

There are other noxious trades carried on in Wandsworth, and Dr. Hassall expresses his conviction of the absolute necessity of putting a stop to these most prolific causes of disease.

The examples of specific localizing causes of cholera given in the preceding pages appear to be enough to illustrate the usual influence of these causes on the public health, and I shall therefore give a general outline from the Inspectors' reports of the localizing causes in other parts of the metropolis.

Dr. Macloughlin points out the chief sanitary defects in the Unions under his inspection as follows:—

"The great want of *Stepney Union* is proper sewerage and a proper supply of wholesome water."

"Great complaints exist against the bad smells arising from "noxious trades, such as chemical works, bone boilers, India rubber "manufactories, and heaps of dung, dust, and putrid matter, animal "and vegetable," which cannot be completely abated in the present state of the law.

It is stated that one of the Union guardians himself occasions a serious nuisance by collecting dung and night-soil and keeping pigs. In this instance two orders for cleansing were made, one after the other. Both were obeyed, but in a few days the nuisance was as bad as before.

Dr. Macloughlin states that diarrhœa and cholera were most prevalent and fatal in crowded localities, where the defective sanitary conditions above named were most marked.

In *Poplar Union* great complaints were urged against noxious trades, defective sewerage, and unwholesome water. These, he says, "materially injure the health of the poorer inhabitants, and "make them so liable to fevers at other times, and now to attacks of "diarrhœa and cholera."

He mentions several instances where, from these causes and from accumulations of filth, the population has been decimated by zymotic disease. The filth was removed with only temporary benefit, for the real cause of the mischief, the sewerage and water supply, being left untouched, things reverted to their old position in a few days.

In *Holborn Union* overcrowded courts and houses were the special seats of the pestilence, and in the localities chiefly affected the great evil was again the defective state of the sewerage and water supply.

Many nuisances existed in various parts of the union, which the guardians abated so far as their legal powers would admit, but as there is no law to prevent the repetition of a nuisance the evil re-appeared a few days after it had been abated.

The local authorities of *St. Giles and St. George, Bloomsbury*, were found to be doing all they could to ameliorate the sanitary condition of the people, but having no control over the sewerage and water supply, or over unwholesome trades, they could do little that was permanently effectual.

They nevertheless appear to have exercised the powers they had with vigour. The courts of suspected districts were kept constantly lime-washed; nuisances were removed; above 400 cesspools were filled up, and improvements conducive to health were effected in upwards of 1,000 tenements.*

Dr. Mortimer Glover describes the localizing causes of the epidemic in the parishes under his inspection as follows:—

In *Rotherhithe* the worst seats of cholera were those districts of the parish traversed by open tidal sewers, up and down which a slight tide flows from the Thames. "Most of these emit a strong smell of "sulphuretted hydrogen, and along the banks of one of the worst, "which I shall call Workhouse-ditch, from its close proximity to the "workhouse, the most numerous and fatal cases of cholera have "occurred."

"The existence of monstrous nuisances was admitted, and the "connexion of these generally with cholera, but the power of "remedying them was totally denied." The local authorities assigning as a reason that nothing effectual could be done without drainage, which they could not carry out for themselves, although perfectly willing to do so, on account of their being within the jurisdiction of the Commissioners of Sewers, from whom they could get no relief.

There were two inspectors of nuisances, but very little real good was effected notwithstanding the inspection.

In *Deptford* matters are, if possible, still worse. The drainage is exceedingly defective, and was an evident localizing cause of cholera. Dr. Glover gives an illustration of two new streets, called Commercial-road and Wellington-street, "where cholera has been most fatal." The houses are two stories high; the ground is open around them, they seem to be houses of a superior character and inhabited by people in comparatively comfortable circumstances. But they have no drainage, and the filth of the houses is left to percolate the subsoil.

"In almost all the places where the disease was prevalent most frightful nuisances existed, such as overflowing cesspools, slaughter-houses, piggeries, &c., along with total want of drainage."

"It may be doubted whether there is a proper sewer in Deptford." Dr. Glover states that the worst features of Newcastle fall short of those of New-street. "On the 2d and 3d September there were at least 40 registered deaths in this immediate neighbourhood and many died who were not registered."

"All attempts," he says, "to remove permanently such a state of things as there exists must prove abortive in the present state of legislation on sanitary matters."

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* Report of the Sanitary Committee of St. Giles and St. George, Bloomsbury.

At *Greenwich* many of the principal seats of cholera were places abounding in nuisances. In York street Dr. Glover found above 200 people living in 20 wretched houses. In No. 5 in this street two deaths from cholera had occurred, and another was impending. Several deaths had also taken place in the immediate vicinity of this house. It was afterwards discovered that under the boarding of a room there was a depth of 10 inches of night-soil which had soaked from the adjoining privies. Dr. Glover says, "This is only one example of the many nuisances" he had observed.

Woolwich has a very active Local Board of Health elected under the Public Health Act, which was found doing its duty most energetically. The deaths from cholera chiefly occurred in Irish lodging-houses. In one of these houses in Rope-yard-rails there were 104 Irish. The house consisted of nineteen or twenty rooms, which had been tenanted by 120 persons previous to Dr. Glover's visit. In this house there were four cholera patients in one bed. Dr. Glover states that the smell in the house was "dreadful." "I "was myself," he says, "instantly conscious as of having received a "dose of poison, was ill all day, and at night had a violent attack of "diarrhœa and vomiting."

Mr. Patterson, who inspected those parts of the parishes of St. James, Westminster, and St. Anne, Soho, which were so severely affected by the epidemic, describes the dwellings as overcrowded, unventilated, without any efficient house drainage; the cesspools and privies overflowing; the supply of water scanty; some of the houses so filthy and unhealthy as to be unfit for human habitation; some of the sewers of the district in a foul condition pouring sewer air through the gulley grates into the streets and houses. He says there are in the district "almost every nuisance and abomination," slaughter-houses, cow-houses, boiling-houses, and other noxious and deleterious trades.

Mr. George Glover reports that the "potteries" in Kensington parish have suffered most severely from cholera. This place still retains its character for filth and disease. Pig feeding and the boiling of offal are still carried on as usual, the existing state of the law not being sufficient to enforce removal of the pigs and other nuisances. In the year 1849 the potteries contained 1,000 persons, fifty of whom died in the first ten months of the year, and of these twenty-one deaths were from cholera and diarrhœa. The population during the present year is about 1,270, and the deaths from cholera and diarrhœa have been thirty-three.

In a report on the condition of the epidemic localities in Waterloo-road district of Lambeth parish made to Dr. Fraser by Mr. Dodd, one of the union medical officers, he gives among the obvious causes of disease the sale of unwholesome food, private slaughter-houses, defective sewerage, untrapped gully grates, overcrowding of houses, and overflowing cesspools.

In a district of the Parish of St. Mary, Newington, called Lock's-fields, a report on which was sent to the General Board of Health by Mr. Keever, one of the medical visitors, it is stated that "diarrhœa and cholera prevailed to an immense extent; and in nearly

"all cases the ravages have been greatest, if not altogether confined "to those tenements, where the water was impure, the drainage bad, "and the cesspools foul and offensive."

The drainage is described as being "everywhere most imperfect." Where the privies communicate with the drains there are no traps, and the smell is very bad at times. The street gratings, the writer says, have been in many instances complained of from want of trapping. It is also a frequent occurrence to see the water-butts placed over untrapped drains. The cesspools are often overflowing, and they were found, in some instances, saturating the ground beneath the floors of rooms.

"There seems to be no system of scavenging," and all sorts of filth and débris "seem to remain for an indefinite period in many of the "bye-streets."

Dr. Gilbert King, who inspected the shipping on the Thames, points out in his report the foul and unwholesome state of the Thames water, from its intermixture with the London sewage. This water is used on board ship, and acts as a predisposing cause of cholera. The river banks, at low water, are in a filthy state from the same cause, and often expose the contents of privies or cesspools which have flowed from the houses. The exhalations from these pestilential banks of mud under a hot sun are most injurious to the purity of the air. Dr. King also ascribes much of the disease on board coal vessels to the dreadfully filthy condition of the sleeping quarters of the sailors, who are thus exposed to almost every cause likely to produce disease.

Mr. Glaisher has shown that Thames water contains an almost incredible amount of filth derived from the sewers, and that about four millions of gallons of water, loaded with putrescent matter, are every day evaporated from its surface within the metropolis, to be diffused through and to contaminate the atmosphere.*

Section III.

The Water Supply of the Metropolis in relation to the Cholera.

That a certain connexion exists between the use of impure water and the spread of pestilential disease is a circumstance that has been observed from the earliest times, and during the epidemic of 1848–49 it was found that the use of such water led in some instances to severe and fatal outbreaks of cholera.

In the report of the General Board of Health on that epidemic a number of carefully observed cases of this kind are given. One of these, the details of which I obtained myself, took place at Salford, in a street containing 90 houses. The inhabitants of 30 of these houses used water from a well, into which a sewer had leaked, and among them there were 19 cases of diarrhœa, 26 cases of cholera, and 25 deaths; while in the remaining 60 houses, which derived their water supply from purer sources, there were 11 cases of diarrhœa, but neither cholera cases nor deaths.

* Report of the Registrar-General on the Cholera of 1849.

There is a difference of opinion concerning the part which impure water plays in the phenomena.

It is believed by some, that the water which induces cholera contains the specific poison of cholera in it, probably derived from the evacuations of cholera patients; while others believe there is no sufficient evidence of this being the case, and they consider that all the facts go to prove that water containing putrescent organic matter acts as a very powerful predisposing cause of the pestilence in a similar way as does putrescent organic matter introduced into the system by the atmosphere or by food, but not as a specific poison.

The matter in dispute is really of no great practical value, for if it be a fact that the use of impure water is dangerous to the public health, the manner of its action is of very secondary importance, at least for practical purposes.

The controversy however having given rise to distinct allegations, setting forth the destruction of human life occasioned by the quality of the water supplied by the companies, especially to the southern part of the metropolis, it became necessary to inquire, 1st, into the quality of the water, and 2d, into the relation, if any, between the use of the water and the mortality from cholera.

Quality of the Water Supply.—The facts about to be stated respecting the water supply of the metropolis, refer exclusively to its condition during the prevalence of the late epidemic at a period when (except in the case of the Lambeth Company) the provisions of "The Metropolis Water Act, 1852," had not come into operation. Under that Act, the sources from which the water is taken, the manner of conducting it to the metropolis, and the construction of the reservoirs will be improved, and a portion of the evils complained of will it is hoped be remedied.

Two distinct and separate inquiries have been carried on to determine the quality of the water; one microscopic and the other chemical. The microscopic inquiry was remitted to Dr. Hassall, who has had great experience in similar investigations, and the chemical inquiry was undertaken by Dr. R. D. Thomson, lecturer on chemistry to St. Thomas's Hospital, who has specially studied the influence of waters for domestic use on the public health.

Dr. Hassall was directed by the President to examine specimens of the water supplied by all the metropolitan companies, to be taken at the source of the supplies, from the tanks in which the water is stored, from the companies' mains, and from service pipes, cisterns, water-butts, tubs, &c., through which the supply is received for use in houses and neighbourhoods where cholera was prevalent.

The microscope is a most important means of conducting such inquiries, because it affords a kind of evidence as to the relative purity or otherwise of water which could not be so well estimated by chemical analysis alone. The result of the whole inquiry has been embodied in a series of extremely interesting reports and drawings, of which I proceed to give a brief abstract.

Dr. Hassall states, that the sources from which every metropolitan company, without exception at present, derives its supply are more or

less impure. All the waters taken at those sources exhibit, under the microscope, a greater or less amount of organized matter, living and dead. The presence of living organisms is a sure test of the presence of dead organic matter, and all the specimens examined contained living organisms, animal and vegetable. The purest water at its source is the Lambeth water, taken from the Thames at Thames Ditton. The most impure, on the south side of the river, is the Southwark and Vauxhall water, taken at Chelsea Reach. This last water contains the débris of food derived from the waterclosets and sewers of the metropolis. It also contains living organisms which naturally belong to brackish waters, and proves that a certain amount of tidal sea water is supplied to the inhabitants of the district.

The same living organisms and organic matters are found in the water from the tanks, mains, and service pipes of all the companies. In certain instances, the water is so loaded with organic matter that zoophytes and vegetable productions are developed rapidly, and to a great extent in the mains, and are discharged in masses into cisterns and butts along with the water, and in these receptacles the water is in its worst condition, often containing large worms, vibriones, fresh-water shrimps, fungi, and other cryptogamous plants, in addition to myriads of animalcules belonging to a number of different genera and species.

The real practical deduction from the whole of the microscopical analyses made is, that there is no water at present supplied to the metropolis that does not contain dead and living organic matter, animal and vegetable. But, as has been stated, the Thames Ditton water, supplied by the Lambeth Company, is by much the purest of the waters, while the Southwark and Vauxhall water is one of the worst, and the waters of the other companies might be arranged in a series between these two. The Southwark and Vauxhall water is so similar to the river water, that Dr. Hassall says, "between "it and the water of the Thames, as taken from the river at the "spot at which the Southwark and Vauxhall Company obtains its "supplies, there is frequently only that amount of difference which "would arise from mere subsidence."

The effect of storing water in butts and cisterns is to increase its impurity. These receptacles are described as sometimes situated so inconveniently as not to admit of being cleansed. Sometimes they are placed close to privies, so that the water imbibes the emanations proceeding from them. Often the water-butt has no lid, and the water is thus exposed to light and air, both of which promote the generation of organic life. Sometimes the lid is permanently fastened down, and the cistern cannot be cleansed. "Examples without end," he says, "of these conditions might be cited. In the houses and "cottages of the middling and poorer classes the water is, for the "most part, stored in butts, vats, and pans; these commonly have "no lids, and they are unprovided with waste-pipes," and "the "water is very apt to flow over at the top and saturate the soil "around the house." "In many cases, the size of these butts is so

"small, that they do not afford anything like a proper supply of "water, while, in a great many houses, the water is not laid on at "all," and "the daily supply is procured out of the house, and is "kept in any jugs, dishes, or pans the people may happen to possess, "which are usually placed in the single room which serves as kitchen, "sitting-room, and bed-room."

The use of cisterns and butts tends also to the accumulation of the various organic matters deposited from the water. "We have seen," says Dr. Hassell, "dozens of cisterns half filled with green confervæ, "and other vegetable and animal productions." Such is the amount of noxious impurities sent into the mains, that a practice prevails in the districts supplied by the Southwark and Vauxhall Company of tying over the service-pipes and tops of the cisterns pieces of muslin, flannel, and very frequently old stockings, to act as filters, and "the "quantity of dirt and organic matter obtained in this way in a short "time is often perfectly surprising."

The water itself, as delivered, is described as "nearly always more "or less opalescent, containing in large proportions organic matter, "living and dead, vegetable and animal." "The complaints made of "this water are almost universal." "The Lambeth water," Dr. Hassall says, "is comparatively a pure water, clear and bright, "the amount of sediment furnished by it not being considerable. "This water is filtered, but the Southwark and Vauxhall water is "not filtered before delivery. At all events the amount of deposit "was usually so great, and the nature of the organic impurities "such, that it is scarcely credible that this water is subjected to any "process of filtration previous to distribution."

Dr. Hassall also examined a number of specimens of shallow well and pump waters, taken from neighbourhoods where cholera had been severe, and states, as a general conclusion, "that nearly all were of a very impure description."

I have received from Dr. Thomson the following abstract of the results of the chemical analyses of the London waters, which corroborates those arrived at by the microscope:—

"The chemical investigation has extended to the examination of upwards of 70 samples of water supplied by the various metropolitan water companies, principally to houses in which deaths occurred from the epidemic. The result of these analyses has shown that the greatest amount of foreign matter existed in the water supplied by the Chelsea Company, its total amount of impurity being 60 degrees (reckoning each grain per gallon a degree), while its amount of organic impurity was 5·41 degrees. This result was obtained in September, during the prevalence of the cholera, but it was afterwards (in December) found to be characterized by 37 degrees of impurity. The actual amount of impurity may vary from day to day, according to the state of the tide when the companies' engines are in action.

"Next to the Chelsea water the most impure water was found to be that of the Southwark and Vauxhall Company. Its impurity varied from 34 degrees to 72·66 degrees on one occasion, but the mean of

13 experiments gave 45 degrees as the mean impurity, that of the organic impurity being 4 degrees.

"The most striking evidence of the mixture of this water with decomposing animal matter was obtained by the extraction of a much larger quantity of ammonia from it than has been hitherto suspected. Indeed, the amount of this alkali is so considerable (as much as ·773, or upwards of three quarters of a grain of carbonate of ammonia per gallon) that it can be distilled over, fixed by means of an acid, and crystallized with the greatest facility. But this strong test of animal impurity was found in all the waters, and in very appreciable amount in the Thames Ditton water ($\frac{64}{1000}$ per gallon of carbonate of ammonia).

"This fact is an important but unfortunate one, since Thames Ditton has been chosen as the source of supply of all the Thames water companies.

"The following table gives the relative degrees of the total impurity of the metropolitan waters supplied to cholera houses, and taken as soon as possible after the occurrence of death.

Lambeth	13·36 degrees.
Grand Junction	14·46
West Middlesex	19
Southwark and Vauxhall	45
Chelsea	60·17
New River	17·18
Do. do. Soho District	25·64*
East London	18·30
Kent	17·76
Hampstead	24·22

"The water employed for domestic purposes has been likewise examined from a number of localities in which cholera was prevalent, such as Sandgate, Brasted, Newton Abbott, Nottingham, and numerous shallow wells in the metropolis, which last have been found much more saturated with noxious matter than could have been anticipated, the impurity rising from 100 degrees in the east to 180 degrees in the west of the metropolis."

The Medical Inspectors, who were more specially occupied with the measures for mitigating the disease in their respective districts, have given the results of their observations as to the condition of the water supply, as they found it in affected houses and neighbourhoods.

Dr. Greenhow says, "the Lambeth water in the tanks was beautiful, the smallest object being clearly discerned at the bottom," while the Southwark and Vauxhall water "was most turbid, full of animalcules, "and of small substances of confervoid or other vegetable character, "which, gradually coalescing, float near the surface, presenting "whilst in the water much of the appearance of small sponges."

Deptford, Greenwich, Woolwich, and the part of the parish of Rotherhithe east of the Surrey canal, are supplied from the Kent

* During the severe outbreak of cholera in St. James Westminster, and St. Anne Soho.

Waterworks, the western district of Rotherhithe being supplied from the Southwark and Vauxhall Waterworks.

Dr. Glover describes the sources of both these waters as pretty much alike, one being taken from the Thames, the other from the Ravensbourne, both of which receive a large quantity of sewage. Both waters contain organic matter and infusoria, the only apparent difference between them being, that the Kent Waterworks Company filter their supply better before it is delivered. This process of filtration, nevertheless, leaves a considerable amount of organic matter in solution.

In Bermondsey, which is also supplied by the Southwark and Vauxhall Company, Mr. Walsh says, "The quality of the water supply continued to be much complained of." Many courts are supplied by one or more open pipes, which flow for a certain time every day (except Sunday), and the daily supply for each house must be caught during the flow, and stored for use. In unpaved or ill-paved courts, the effect of this mode of supply upon the soil is very bad.

"The clause of the Water Act, whereby tenants or landlords may be compelled to lay on water, has never been put in force. There would be obvious injustice, it is felt, in forcing upon them such bad water."

"The baths and wash-houses have been supplied with water of so bad a quality that they have become greatly disused."

In his report to Dr. Fraser on the Waterloo-road district of Lambeth, Mr. Dodd, Union medical officer, remarks, "This district "is also partly supplied by the Vauxhall Water Company, and the "water is of a poisonous character, very full of dirt and animal matter, "and many of the water-butts are kept in such a bad state, and placed "so near the privies, as to be unfit for drinking use."

Dr. Hassall says, in regard to the Southwark and Vauxhall water, that it is his deliberate opinion that the use of this water ought not to be permitted an hour longer than is absolutely indispensable.

He further states that in several localities in the parishes under his inspection, there is no water supply at all, the people either buying water from water carts, or taking it from the Thames, the Wandle, or even from ditches.

With reference to the defective and unwholesome system of distribution at present in use, he says, "I beg to express my conviction "that the water supply of the metropolis will never be in a condition "at all satisfactory, until the use of cisterns is abandoned and the "constant method of supply adopted. This conviction has been forced "upon me by an inspection of a great number of the cisterns, butts, "pans, and tubs, now in use as receptacles for water."

Dr. Greenhow states that the intermittent nature of the water supply is a subject of universal complaint. It is sometimes on for no more than half an hour, unless there be a fire. The quantity is stated to be insufficient. The water butts in a very bad condition, and often extremely foul. There are frequently no butts at all, and he people have to watch for the water coming on, and in these

cases a sufficient supply is never obtained. In a small portion of St. Saviour's parish, there are 1,000 families without any means of storeage. Sometimes water tanks are constructed in the ground, close to privies, cesspools and sewers, the contents of which permeate the walls of the tank and pollute the water. The water for Bolton's gardens, Chelsea, a place which suffered greatly from the epidemic, is stored in two hogsheads which supply twenty houses, and the hogsheads, being very leaky, were empty for the greater portion of the day. In Eatling's buildings there is a small tank to supply a number of families, but the stone slab covering it is cemented closely down and cannot be removed to cleanse the tank. In Chelsea there are still a great many places where the people are dependent for water on bad wells or on the river. The inhabitants of Sun-court have to beg water of their landlord, who is a publican. Another publican in the neighbourhood supplies the people with water for dietary purposes.

The parochial authorities have power to compel water supply, but it is inoperative in many cases, as the authorities themselves often own the property, and Dr. Greenhow says, that the law does not apply to a large class of houses which have been sub-divided to accommodate a number of families, on account of the aggregate weekly water rate for the house being necessarily above that specified in the Act.

The water rate is stated to be ill-defined, variable, and not levied in proportion to the rental.

Dr. George Glover calls attention to the defective nature of the water supply in his district. It is complained of as being deficient in quantity and bad in quality. It is received in tubs, pails, &c., which are generally placed close to the privies.

The grievous deficiency of water arising from the manner of distribution was experienced in many of the streets and houses most severely affected by cholera.

Mr. Walsh states that "the localities visited in Westminster, New-"court, Ship-court, and others near the workhouse, were nearly all "suffering from want of water. The supply is only for an hour or less "daily; none on Sunday, and frequently from *open pipes only* "running to waste until caught."

It has been stated to me, as a proof of the mischievous results of the present system of supplying the metropolis with water, that the two companies supplying—the one the best, the other the worst—water south of the Thames, often run their mains through the same streets, but by an arrangement between the companies, no one, however convinced he may be of the unwholesome character of the water supplied to him, can obtain the purer water.

Effect of the Water Supply on the Health of the People.—In the districts south of the Thames, where nearly every conceivable sanitary defect exists, there are great difficulties in estimating the precise statistical effect of the water used on the health of the population during the recent epidemic. So far as the inquiries instituted by the Registrar-

general go, they certainly exhibit some striking results, which are thus stated.

" In 26,107 houses that derived the water from Ditton, 313 deaths from cholera occurred in 10 weeks. In the 40,046 houses that received the impure water from Battersea, 2,443 persons it was ascertained died from cholera in the same time. The deaths in the latter districts exceeded by nearly 2,000 the deaths that would have occurred if cholera had only been as fatal as it was in the houses that derived their water from Ditton. The Registrars were probably in some cases misinformed, but there is reason to believe that no undue proportion of deaths is referred to houses that the Southwark Company supplies."

It would thus appear that the mortality in a given number of houses supplied by the Southwark and Vauxhall Company when compared with the mortality in the same number of houses supplied by the Lambeth Company would be about as 5 to 1.

When it is considered that the sanitary condition of the population does not materially differ, except in the quality of the water supplied by the two companies, it is difficult to resist this statistical evidence of the predisposing effect of the Battersea water, and of the loss of life which has arisen from its use.

In Dr. Thomson's report already quoted he says :—

" If water be not an accessory in the production and propagation of cholera, it is a remarkable collateral fact that where cholera has been most fatal in the metropolis the water supply has been most impure. In the Soho district a very remarkable circumstance occurred in the houses supplied by the New River Company. In these it was found that the water, although taken on the same day, possessed a totally different composition from that contained in the reservoir at the New River Head; for while the impurity of the reservoir water was 17.18 degrees, that of the Soho district, obtained from the New River Company, as ascertained by the water receipts, but from what source is unknown, was 30 degrees; the organic impurity being 1·51 degrees in the first case and 2 degrees in the second instance."

Dr. Greenhow states, that the districts which were under his inspection are supplied with water from five sources, namely, Lambeth, Chelsea, Southwark and Vauxhall Waterworks, the Thames, and springs.

The Board of Guardians of St. Saviour's entertain the opinion, he says, that the nature of the water supply had a material influence on the development of the epidemic in their union.

The facts which apparently justify this inference are the following :

In the year 1849, both the parishes of this union, St. Saviour's and Christchurch, derived their water supply from the same source, namely the Thames, through the Lambeth and Southwark and Vauxhall Companies.

In that year the mortality from cholera was 100 in 10,000 of the population of Christchurch, and 73 in 10,000 of the population of St. Saviour's.

After the epidemic of 1849, Christchurch parish was exclusively supplied with the new and comparatively pure water of the Lambeth company, while St. Saviour's continues to be mainly supplied with the impure water of the Southwark and Vauxhall Company. During the late epidemic the mortality in St. Saviour's had advanced from 73 to 97 in 10,000, while the mortality of Christchurch had fallen from 100 in 10,000 to 44 in 10,000 of the population. This great difference is sufficiently striking; but, while admitting the beneficial results of the purer water, Dr. Greenhow considers it not to be entirely due to the water alone, for Christchurch parish has been improved in other respects of late years, by the covering over of a pestiferous ditch which formerly occasioned a great deal of atmospheric impurity in the neighbourhood, and by other sanitary measures.

In proof that impure water, though a predisposing cause of cholera, does not act as a *specific poison* in producing cholera, Dr. Greenhow adduces several instances in which houses supplied by the Lambeth water suffered from cholera, while those supplied by the Southwark and Vauxhall water escaped. In these cases the greater predisposition to the disease is considered to have arisen from the foul and offensive state of the drainage in the houses supplied by the Lambeth water, and the diminished liability of the houses supplied by the Southwark and Vauxhall water is traced to the counteracting influence of the better condition of the drainage, and to the otherwise better sanitary condition of the houses. He states, nevertheless, as the result of his experience, that the use of the Southwark and Vauxhall water "very greatly aggravated the pestilence."

Several facts were stated to Dr. Mortimer Glover, in the districts under his inspection, to show the connexion between the use of the Southwark and Vauxhall water, and the prevalence of cholera.

Thus, in the part of the parish of Rotherhithe supplied from the Kent Waterworks, 15 cases of cholera had occurred up to a certain date, while 185 cases of cholera had occurred in other parts of the parish; and Dr. Glover says, that the medical men of Rotherhithe were of opinion, "that the impurity of the water had been influential in augmenting the severity of the disease." On the other hand, Dr. Glover states with justice, that the waters are very similar in character, and instances are adduced by him in which violent outbreaks of cholera took place in houses supplied from the Kent Waterworks; so that, from a comparison of the mortality of the districts supplied from the two sources, no satisfactory proof can be obtained, that one is more wholesome than the other. Dr. Glover, however, does not deny in the abstract that the condition of the water may be a predisposing cause of cholera, and cites one remarkable instance in favour of that view in his report.

Mr. Keever, one of the medical visitors in the parish of St. Mary, Newington, in his report on his district, already quoted, says in regard to the waters of the Southwark and Vauxhall and Lambeth Companies, that the complaints among the poor as to the water sup-

plied by the former of these companies were general, both as to its quality and quantity; and he adds, "I feel bound to state my belief "that, *cæteris paribus*, diarrhœa and cholera have not prevailed to "the same extent where the water was supplied by the Lambeth "Company." In regard to the deficient supply of water for cleansing purposes, Mr. Keever says, "a thunderstorm is a great boon to the district."

Where water for domestic use has become actually poisoned by sewage, the effect in predisposing to cholera is much more powerful. An instance of this kind, which occurred at Chelsea, is mentioned by Dr. Greenhow. A drain from Sun-court, crossing Lombard-street, passes through the cellar of the house No. 18, on the opposite side of the way, and so into the river. There is a valve placed at the mouth of the sewer, to prevent the tide from entering it, which valve is under the control of the occupier of the house. On one occasion, during the prevalence of the epidemic, he neglected to give egress to the confined sullage, by opening the valve at the recession of the tide, and the sewer water escaped into a well in the cellar of the next house. Several of the persons in the house used this vitiated water, all of them had diarrhœa, and two had cholera, both of whom died.

In summing up his inquiry as to the effect of impure water on cholera, Dr. Greenhow says, "although doubtless the unwholesome "water has much aggravated the result, it is only one cause among "several;" and he adds, "the amount of mortality has generally borne "a direct ratio to the amount of atmospheric contamination."

On the whole, then, the evidence, from the experience of the epidemics of 1849 and 1854, as to the effect of impure water during an epidemic of cholera, may be summed up as follows:—

1st. That there is no sufficient proof that water in this condition acts specifically in generating cholera, or, in other words, that it is the specific cause of cholera.

2d. That the use of water containing organic matter in a state of decomposition is one predisposing cause of cholera.

3d. That the use of such water has aggravated the severity of the late epidemic, especially in the districts south of the Thames.

Section IV.

Measures adopted by the Boards of Guardians.

I next proceed to show from the Inspectors' reports what measures for protecting the public health they found in operation when they entered on their duties at the height of the epidemic, and to what extent the provisions of the Nuisances Removal and Diseases Prevention Act, and the Regulations and Instructional Minute of the General Board of Health, had been complied with.

Sanitary Precautions.—In Wandsworth and Clapham Union. Dr. Hassall states that there were six inspectors of nuisances appointed for this Union, but they were most inadequately paid. In

consequence of this, with the exception of Mr. Frost, they did but little, and often resigned their appointments when their services were most required. Very little chloride of lime was used for disinfecting purposes.

Dr. Hassall recommended additional scavenging and disinfecting; that a notice should be issued recommending the inhabitants to clean out all water butts and cisterns, and that the directors of the Southwark and Vauxhall Water Company should be recommended to clean their mains more frequently.

Although these precautionary measures were better carried out in this Union than in Lambeth, Dr. Hassall still considers that much more would have been done had the General Board of Health possessed powers for enforcing its recommendations. He says, "the "Guardians, as a body, are not fully alive to the value of cleansing and "disinfectant measures; they are not sufficiently impressed with the "fact, that it is cheaper to prevent disease than to treat it; and they "consider, that if some five or six cases of nuisances are brought "before the Board each week, all that is requisite is done."

He points out, that the inspectors of nuisances, as at present appointed, are by no means sufficient for protecting a population from epidemic disease. They are appointed simply for an emergency, and dismissed when it is over; while the necessity of continued inspection and cleansing of epidemic localities is not at all recognized.

Dr. Hassall states that in *Lambeth*, at the beginning of his inspection, two inspector of nuisances had been appointed, but the address of one of them given on the placards issued by the Board of Guardians, was at a loan office, with which he was connected, but where he did not reside. No one at the house knew his address. Inquiries were frequently being made for him, but, in almost all cases, applicants were obliged to go away without obtaining a hearing of their cases.

Dr. Hassall afterwards learned that the inspector resided out of his district altogether. On this being pointed out to the Board of Guardians, the inspector was required to reside in his district.

The other inspector resided in his district, but there was no name on the door to indicate his residence.

The inspectors were troubling themselves very little with precautionary measures, being satisfied with performing their average amount of work.

Dr. Hassall states, that in no instance, for a considerable period after the outbreak of the cholera, had the inspectors served any notices on landlords requiring lime-washing, neither had they themselves caused any lime-washing to be done in any part of the crowded and populous districts under their charge.

The inspectors had only one man each to assist them during the whole period of the epidemic, and these men were employed principally as scavengers. One of the inspectors had not used a particle of chloride of lime, and the other had used only 2lbs. for disinfecting purposes, for the greater period during which the cholera prevailed, and that among a population of about 140,000.

Dr. Hassall states that it was only after urgent remonstrances, and after threatening to place himself in communication with the coroner in any cases of death occurring in localities where the proper cleansing measures had not been carried out, that he succeeded in obtaining the adoption of these measures even to a limited extent, but before this was done the worst of the cholera was over, and even now not one tenth part of the cleansing required has been carried out.

In reference to the parishes of St. John and St. Margaret, *Westminster*, Mr. Walsh says, "The Nuisances Committee met once a "fortnight. That the inspectors of nuisances made frequent visits I "can myself affirm, and that lime-washing had frequently been applied "under their directions, but many instances came under my notice of "drains, cesspools, privies, unpaved courts, &c. being still in a most "filthy and dangerous state."

Dr. Greenhow states, that in Chelsea "nothing really had been done by the authorities to prepare for the epidemic," and the condition of the inferior class of property, he says, has gradually been retrograding in a sanitary point of view. As an illustration of the neglect of the Chelsea Guardians, he mentions an instance in which several deaths from cholera occurred from want of the necessary cleansing measures on the part of the Board. In this instance the houses were at last lime-washed throughout, and the cesspools emptied. Twenty-one loads of night-soil were removed, and the whole cleansing expenses for twelve houses amounted to 16*l.*

The neglect in this case arose from the Board not having exercised the powers of the Act so as to have put the houses in good sanitary condition, instead of delaying till several lives had been sacrificed.

Dr. Greenhow states that, in neither Chelsea, St. Saviour's, Southwark, St. George's, Southwark, nor in Newington, were the recommendations of the General Board of Health adopted and carried out with sufficient zeal. "When I commenced duty on the 9th "September," (after the epidemic had attained its maximum,) "I found "no cleansing staff belonging to the Boards of Guardians in any of the "unions or parishes under my inspection."

In St. George's parish, there was an active inspector of nuisances and several sub-committees of the Board of Guardians for inspecting courts and houses, but neither in St. Saviour's nor St. George's was any attention paid to the sanitary condition of the interior of the dwellings.

The inspector of nuisances of St. Mary, Newington, was inadequate to overlook so large a district.

In Chelsea, the relieving officers acted as inspectors of nuisances, but most inefficiently, on account of their time being almost wholly absorbed by their ordinary duties.

At *Rotherhithe*, Dr. Mortimer Glover found two inspectors of nuisances, and great efforts made to get rid of nuisances, but without success; the authorities alleging their want of jurisdiction over the sewerage as a reason, and the Guardians declined to proceed with the removal of nuisances, as entailing a useless expense.

There was no inspector of nuisances at *Deptford,* when cholera was at the worst.

In *Greenwich* there was at the same time no inspector of nuisances, and no attempts being made to abate nuisances.

Taking all the parishes together, in which the epidemic was most fatal, it appears that in not one of them was the preventive machinery, sanitary and medical, organized in accordance with the Minute of Instruction, although some parishes had done more than others.

Houses of Refuge.—The opening of places of refuge, in which to receive families from overcrowded and infected houses and neighbourhoods until their houses were cleansed and lime-washed, was attended by the most salutary results during the epidemic of 1849.

The General Board of Health at that time issued special orders to the parochial authorities for providing such houses, and the results of the experience obtained, were sufficiently remarkable to prove that the removal of the people from places where cholera has become localized, is one of the most effective means of preserving human life.

It has been shown, that when cholera attacks the inmates of any house or group of houses, between 30 and 40 per cent. of the attacks take place in houses where more than one person has already suffered, and that in some instances 87 per cent. of the cholera attacks, and 61 per cent. of the deaths have taken place in houses where other attacks had already occurred. On removing these same people to places of refuge out of the affected district, it is found that a large proportion of them are seized with diarrhœa, which is easily discovered and cured by the medical officer in charge of the refuge, and that very few of the cases go into developed cholera.

The experience of six houses of refuge during the cholera in 1849, given in the report of the General Board of Health, showed that out of 1,691 persons removed from infected houses and localities, there were only thirty-three cases of cholera and ten deaths, a mortality of less than 0.6 per cent. of the population, or less than one twentieth part of the mortality in many affected courts and alleys.

In their Regulations and Instructional Minute, issued before the appearance of the late epidemic, the General Board of Health called the attention of the Boards of Gardians specially to this means of saving life; but I do not know of a single instance of any metropolitan parish having had a place of refuge, except the workhouse, in readiness before the epidemic broke out. In only one or two instances was a place of refuge provided after the disease appeared, and in only one parish, so far as I have been able to ascertain, was the accommodation so provided made use of.

The general practice in regard to this important preventive measure is thus stated by Dr. Greenhow:—

Another duty entirely neglected by all the Boards, without exception, was the provision of suitable houses of refuge, to which the healthy might be removed from infected houses, and much loss of life was no doubt entailed by this neglect. In a few cases people were removed to workhouses, but the working classes very naturally

refused to avail themselves of such a provision for their safety. Dr. Greenhow says, "one woman told me that rather than become a pauper, she would drown both herself and her children."

Dr. Mortimer Glover says that he strongly recommended the opening of houses of refuge at Rotherhithe, Deptford, and Woolwich, but without effect. At Deptford, Captain Martin offered the use of a ship for a hospital, but the offer was either not accepted at all, or the acceptance was delayed till it was too late.

In the parishes of *St. John* and *St. Margaret, Westminster*, Mr. Walsh says, "the notoriously filthy and overcrowded state of many whole streets and courts, pointed out the providing houses of refuge as a measure of the most obvious and urgent necessity.

"The Improvement Commissioners had and still have several of their condemned houses unoccupied. An inquiry made by me at the office produced a most complete and unqualified offer to place any of these houses which might be deemed suitable at the disposal of the Board, but no use whatever was made of these unusual facilities."

The only instance which has come to my knowledge of the removal of people from infected houses and localities, took place at Fulham, where the Guardians erected a large tent outside the workhouse for receiving children. In this tent they lived and slept.

Dr. Hassall gives the following as the result of the proceeding.

"I find," he says, "that 76 children in all had been received into "the tent; of these nine became subsequently attacked with "diarrhœa, and two of these cases passed into cholera, but both ended "in recovery. The first case of diarrhœa occurred three days subse- "quent to the removal from an infected house."

This experience confirms that of the epidemic of 1849, and along with it proves how large a sacrifice of life has been entailed on the community by neglect of this important precautionary measure.

Medical Relief Measures.—Before proceeding to describe the measures adopted for the medical relief of cholera, I shall abstract a brief description of the state of the health of the population from the Inspectors' reports, in order to show the nature and extent of the relief that was necessary to meet the emergency.

In describing the circumstances attending the appearance of the epidemic, and the universal prevalence of diarrhœa, Dr. Greenhow says that the choleraic aspect was generally well marked, and could be detected in persons residing in districts where cholera was prevalent, although perhaps these persons were free from disease, or were at most suffering from very slight diarrhœa; that cholera manifested the usual tendency to partial local outbreaks, attacking a single court or even a single house, cutting off several persons and then disappearing; that in all the districts there were nevertheless certain favourite localities from which it was hardly ever absent while the epidemic lasted. "Thus the first cases of cholera in Chelsea, in 1832, "were in Augusta-court, Lawrence-street, wherein there have recently "been several fatal cases." The earliest as well as the latest cases of the epidemic in Chelsea in 1848, were in White Hart-court, Lombard-street. The name of the court was changed in consequence,

but true to its laws, cholera appeared in the court early in the present epidemic, a death took place in the same house in which there was a fatal case in 1848. Other cases, and at least one other death occurred, and diarrhœa prevailed so extensively that one-half of the inhabitants were under treatment for it. Other similar instances are also mentioned.

It was observed in the parishes of *St. Giles and St. George, Bloomsbury*, that in nearly five cases out of six, the late epidemic occupied the same localities as its predecessor of 1849. Even particular houses showed a local affinity for the disease. Thus in eighteen such houses, there are recorded nearly one-third of the whole number of cases, and of these same eighteen houses every one was also visited by the cholera in 1849.*

The tendency to partial outbreaks was observed with regard to diarrhœa as well as cholera, and although Dr. Greenhow was occasionally informed of cases in which the more malignant symptoms came on at once without the previous existence of diarrhœa, he himself met with no such case, but he "invariably found on careful "inquiry, that diarrhœa of longer or shorter duration had preceded "the more urgent symptoms." Most frequently diarrhœa had existed for several days or at least for a sufficient number of hours to have given ample warning. In a few instances, the interval betwixt the first appearance of the disease and its full development, did not exceed four or five hours.

The general curability of the diarrhœal stage, even in localities where the epidemic was most severe and amongst classes of persons peculiarly predisposed to cholera, is evidenced by a fact stated by Dr. Greenhow, that "out of 330 cases of diarrhœa among the inmates "of St. Saviour's workhouse, only one passed into cholera and that "recovered." It would be easy, he says, "to multiply evidence on this head," and that although the severe and rapid cases of cholera "are probably death-stricken from the outset," such cases are exceptional, and by no means confute the ordinary opinion of medical men, that treatment in the earlier stage of the disease "is for the most part successful."

Diarrhœa is stated by Dr. Greenhow to have been "extremely common during the existence of cholera in all the localities." In most of the houses in which cholera occurred, diarrhœa was still more prevalent ; in many no individual altogether escaped. In fact comparatively few persons in an epidemic district passed through the entire course of the visitation without some symptoms of indisposition. Referring to this general effect of the epidemic Dr. Greenhow says, "Between the cold pulseless moribund patient in the last stage of "extreme collapse and the person whose indisposition was so slight "as not to interfere with his ordinary pursuits there was, it is "true, a vast gulf, but this was spanned by a series of cases differing "from each other by imperceptible degrees of severity."

* Report of the Sanitary Committee of St. Giles and St. George, Bloomsbury.

Dr. Milroy, who made a careful inspection of the *Parish of Camberwell*, reported to the President of the General Board of Health that diarrhœa prevailed extensively in all the districts; that in the great majority of the cholera cases there had been premonitory symptoms; that the cholera cases were generally seen for the first time in collapse or verging towards it; and he states that in one district of the parish out of fifty-nine cases of cholera ten were first seen in collapse and all died, while the remaining forty-nine cases were first seen at an earlier stage and all recovered except nine.

Dr Macloughlin states that in *Stepney Union* diarrhœa prevailed to such an extent that it was found impracticable to record all the cases, but between 5th August and 14th October 1854 there had been dispensed gratuitously as much astringent medicine as would have served for at least 15,000 persons. The persons actually known to have received medical attention for diarrhœa between these two dates were 8,610.

The medical officers and visitors stated that all the cases of cholera they had seen were preceded by diarrhœa. If the proportion of cases to the mortality held good over the whole union, the total registered deaths from cholera would represent 45,000 epidemic diarrhœa cases.

In *Poplar Union* Dr. Macloughlin states that during the five weeks preceding his inspection diarrhœa had been increasing rapidly, so much so that the medical men and their assistants were unable to spare time to take down the names and addresses of applicants for relief.

He states that the medical officers in this union had not had a single case of cholera without previous diarrhœa for a longer or shorter time. A similar statement was made by all the house-to-house visitors. In this union 9,899 persons are known to have been treated for diarrhœa.

In *Holborn Union* the medical officers reported diarrhœa to be very prevalent, and both medical officers and house-to-house visitors stated that they had not had a single case of cholera which had not been preceded by premonitory diarrhœa. From the first week in August to the 14th October there were attended by the medical officers and visitors 2,600 cases of diarrhœa.

In *St. Giles's* diarrhœa and cholera were very prevalent in the usual epidemic localities.

Every case of cholera had been ushered in by diarrhœa of a longer or shorter duration.

The medical officers and visitors attended from the beginning of August to the 14th October 4,061 cases of diarrhœa, of whom 22 died, and 120 cases of cholera, of whom 73 died. From a very extensive experience, during the present and former epidemics, Dr. Macloughlin states it as his conviction that diarrhœa is invariably the first symptom of cholera.

Dr. Mortimer Glover states that in the parts of *Deptford* and *Greenwich* which suffered so severely diarrhœa "prevailed throughout."

Severe diarrhœa rapidly passing into cholera prevailed all over the affected parts of the parishes of *St. James Westminster*, and *St. Ann Soho*, which were under the inspection of Mr. Patterson. In short, wherever the cholera existed diarrhœa accompanied it; so far as is known, almost every cholera case had been preceded by diarrhœa, and there is reason to fear that many lives were lost through inefficient measures for checking the milder stage of the disease.

Mr. Walsh cites as a striking illustration of the severity of the epidemic in the parish of Bermondsey, where no fewer than 838 persons died of cholera, that "diarrhœa seemed both by the people and "the medical officers to be taken but little account of, the former "not applying for its relief, and the latter not always recording the "relief given." This one fact shows the absolute necessity which existed for an extensive and thoroughly efficient system of house-to-house visitation, and it points very clearly to one source of the great fatality of the epidemic in that parish.

This fatal neglect of the premonitory diarrhœa Mr. Walsh ascribes partly to the medical relief of cholera having been made a parish matter, for, he says, the numerous respectable working population of Bermondsey, who were the chief sufferers, naturally held anything connected with the parish "in the greatest abhorrence."

House-to-house Visitation.—The medical relief of cholera, so far as such relief can be rendered available for diminishing the mortality from the disease, requires to be so organized and directed as to cope with and cure it in its earlier stages, instead of being mainly reserved for the fully developed form of the pestilence.

In the report and appendices of the General Board of Health, on the epidemic cholera of 1849, it was shown not to be enough for the accomplishment of these objects, to open dispensaries for the distribution of medicines to all applicants. It was proved also to be a necessity, founded on the nature of the disease, that medical relief should be sent into affected districts, instead of trusting to relief being applied for by the patients themselves. It was pointed out in the same report, that in all localities where cholera had broken out, or where an attack is imminent, diarrhœa is extensively prevalent. That the poor themselves overlook the dangerous significance of this symptom. That they are often apathetic, and unwilling to take any steps to arrest the diarrhœa. That medical aid is often not applied for till it is too late to be of use. That deaths from cholera sometimes take place without any medical attendance. That fatal cases of cholera are in reality those cases which are hardly ever seen by the medical attendant until the disease is fully developed, or until collapse has come on, and that when the epidemic is brought under treatment in its earlier stages, a very small proportion of the cases prove fatal.

These peculiarities of the epidemic had indeed been recognized as far back as the year 1832, and domiciliary visitation was tried in one or two instances.

In the first notification of the General Board of Health, issued at the very beginning of the epidemic of 1848, the local authorities were recommended to organize lay visiting committees, to ensure the

treatment of the premonitory diarrhœa. In my report to the Board on the epidemic of 1848 and 1849, I stated, that on the 7th December, 1848, during the severe epidemic cholera in Dumfries, when lay visitation was not applicable to the emergency, I recommended the Board, for the first time, to substitute medical house-to-house visitation for lay visitation, to arrest the disease in its earlier stage, by sending medical aid to the houses of the people, "by enjoining all "medical officers" (14 in number for a population of 10,500) "to visit not only cholera cases, but to make a house-to-house "visitation throughout their respective districts, to carry with them "medicines for immediate use, and to administer them on the spot "to all persons affected by diarrhœa. The visitation to be made "once a day at the least."

This recommendation was made matter of special order by the Board on the 9th December 1848, and was carried out with results so beneficial, that medical house-to-house visitation was adopted in other affected towns during the whole course of the epidemic.

House-to-house visitation was carried out to some extent in the metropolis, under the inspection of Mr. Grainger, during the epidemic of 1849, and that more good was not done by it at that time is to be attributed to the same causes which have led to its still more limited application during the late epidemic, namely, the remissness of the local authorities. Nevertheless, in 1849, there were discovered by the visitors, and brought under treatment in the metropolitan parishes, within a period of eight weeks, 43,737 cases of diarrhœa, and 978 cases approaching to cholera. Out of this whole number, of 44,715 epidemic cases, only 52 passed into developed cholera. During the same eight weeks, the visitors discovered 780 cases of developed cholera not under treatment.

All the facts stated above were perfectly well known. Moreover, during the severe outbreak of cholera in Newcastle, in 1853, organized house-to-house visitation was the means of saving many lives, and the General Board of Health, in anticipation of the epidemic attacking other districts, drew up and sent to all the parishes in the kingdom their printed Instructional Minute already mentioned, giving directions to the Boards of Guardians how to organize and carry out the measure. Every means of conveying practical information to these Boards had been adopted. But I am sorry to find from the reports of the Inspectors, that when they began their inspection they found that, with one or two exceptions of more healthy parishes, none of the metropolitan parishes had organized or prepared for putting in operation the provisions of the Instructional Minute. In a few of the parishes, after great exertions on the part of the Inspectors, and repeated recommendations on the part of the President of the General Board of Health, a few visitors were appointed, but, in most instances, nothing effectual had been done, and some of the parish authorities eventually did nothing.

In the appendix, Table III., are given the results of the medical relief measures, for a number of parishes, so far as these can be gathered from the parochial returns, and the following table gives the

total numbers of epidemic cases so treated between the middle of August and the end of October.

	Diarrhœa Cases.	Cholera Cases.
Dispensary cases -	14,453	45
Medical Officers -	47,524	3,531
Visitors - -	7,606	481
Total - -	69,583	4,057

Dr. Hassall gives the following account of the medical relief measures in operation in *Lambeth* on the 4th September, when he first inspected the parish during the height of the epidemic.

There were no day or night dispensaries.

There were no houses of refuge.

There were no house-to-house visitors.

The accommodation for cholera cases consisted of two wards in the workhouse.

The medical relief for the whole parish, with its 140,000 inhabitants, consisted of nine medical officers and two assistants.

Dr. Hassall recommended that eight day and night dispensaries should be opened; and that nine house-to-house visitors, to act under the superintendence of the district surgeons, should be appointed.

These suggestions were approved and recommended for adoption by the President of the General Board of Health, but the Lambeth Guardians declined to accede to them.

The parish was therefore left without any adequate protection against the epidemic.

The course which the parish authorities actually took was to issue a circular, offering to the medical practitioners in the parish a small payment for every case that might apply to them. But out of 120 resident medical men, 32 only consented to act on the terms proposed.*

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* The following are copies of the Circular sent to the medical men in the parish, and also of the form they were expected to sign and return to the Clerk.

Lambeth Workhouse,
August 12, 1854.

SIR,

I AM directed by the Sanitary Committee of Guardians for the parish of Lambeth, to acquaint you that during the prevailing epidemic, they are prepared to enter into an engagement with yourself, and other resident medical practitioners, for the first attendance and treatment of all persons (not being private patients) attacked with diarrhœa, at 1*s.* 6*d.* per case, and with cholera 2*s.* 6*d.* per case; and that after such attendance and treatmen they be referred by you to the medical officer of the district for his attention.

If you are willing to accede to this arrangement, I am to request that you will sign the accompanying form, and transmit the same to me forthwith, and upon receipt thereof, I will forward printed forms for reference to the district medical officer.

I am, &c.
W. T. LOGAN, Clerk.

TO THE BOARD OF GUARDIANS OF LAMBETH.

GENTLEMEN,

I HEREBY undertake the preliminary attendance and treatment of all cases (not being private patients) of diarrhœa and cholera which may be brought to my notice, for the sum of 1*s.* 6*d.* per case of diarrhœa, and 2s. 6d. per case of cholera.

August 1854. I am, &c.

On the 7th September, Dr. Hassall found the medical relief in *Wandsworth* and *Clapham Union*, to be as follows.

There were seven district medical officers, and six assistants.

There were no day and night dispensaries, but one dispensary which was opened for a few hours daily.

There were three house-to-house visitors employed in Battersea district, the assistants of the medical officers doing duty in the other districts where necessary.

There was a resident medical officer at the workhouse, and four wards set apart for cholera cases, which were in admirable order.

There were no houses of refuge, the workhouse being used as such, when there was room. The Guardians had, moreover, formed themselves into district committees for inspecting nuisances, &c., so that upon the whole considerable provision had been made for meeting the epidemic in this union.

Considering the extent of the union, Dr. Hassall, with the sanction of the President, suggested the opening of six day and night dispensaries, in parts distant from the residences of the medical officers, and also the opening of a house of convalesence, should the epidemic continue to spread, as relapses from cholera were very common.

Several suggestions as to cleansing measures were also made.

The cleansing measures were adopted, but the other suggestions were not adopted.

Neither in Wandsworth Union, nor in the parish of Lambeth, were the medical relief measures organized on the plan of the Instructional Minute issued by the General Board of Health.

Dr. Hassall points out the entire want of uniformity in the relief measures adopted by the different Boards, and in the amount of medical relief given, and shows the necessity of the General Board of Health possessing sufficient compulsory power, for he says, "in "the majority of cases the recommendations of the Board are not "adopted at all, or else only partially so. If a fixed system of medical "relief were organized alike in all cases, the Superintending Inspectors "would undoubtedly be able to affect a much larger amount of good "than they do now. At present their time and energies are partly "spent in contests with the local authorities in order to get them to "adopt even a portion of the recommendations of the General Board "of Health."

Dr. Macloughlin reports as follows:—In *Stepney* he found that no house of refuge had been provided. That there was only one dispensary for the whole Union, and that although medicines had been placed at four police stations, there was no medical attendant to direct their distribution.

The Guardians had authorized the medical officers to appoint house-to-house visitors, but only one had been appointed.

On the recommendation of the President of the General Board of Health, additional house to-house visitors were employed, and a medical officer appointed for each depôt of medicines.

In *Poplar Union* there were four medical officers for out-door service, and eight day and night dispensaries. The Guardians had

authorized the appointment of house-to-house visitors, but none had been appointed. The medical relief measures in this case were extended by the employment of six house-to-house visitors.

In *Holborn Union* there were three medical officers for out-door service, and ten assistants, who also performed the duties of house-to-house visitors.

The arrangements in Holborn were considered to be sufficient for the then intensity of the epidemic.

In *St. Giles' and St. George's, Bloomsbury*, there were one medical officer, three assistants, and two house-to-house visitors.

In this union two additional visitors were appointed.

Dr. Walsh says, that in the *Westminster parishes*, "the Instruc-"tional Minute of the General Board of Health had not even been "seen by any one of the medical officers, nor had any organization "been made according to its provisions."

In these parishes the returns required for ascertaining the progress of the epidemic were never made, and Mr. Walsh says, "house-to-house visitation had not so much as been attempted."

In *St. Olave's Union*, Mr. Walsh states that the arrangements for attending the parish paupers were most complete; but the very completeness of the parish arrangements rendered them inapplicable for protecting the public health in the union. "The mere fact," he says, "that all applications for medical relief had to be made at the "workhouse, would necessarily limit their number to the very poorest "class."

"No attempt was made at medical house-to-house visitation."

Mr. Walsh's inspection of *Bermondsey* began on the week during which the deaths from cholera attained the maximum, namely 126, and he found that the Board of Guardians had up to that time neglected to put the directions in the Instructional Minute into operation. They had neither house-to-house visitors, nor houses of refuge, and of course they had not adopted the organization in the Minute.

At a later date they got two medical men in practice, one from a distant part of London, to visit for a few hours daily.

No additional dispensaries were provided, nor were the three additional medical officers Mr. Walsh had recommended procured.

"The force of the epidemic," says Mr. Walsh, "therefore, may "be said to have spent itself without any special organization what-"ever, calculated effectually to meet or control it, having been adopted."

"It is admitted, he says, "that during the time of severest pressure on "the medical officers, some few of the cases were not attended to, *even "of those applying for assistance*, and it is impossible not to conclude "that many passed the first and manageable stage, without seeking that "aid which a systematic house-to-house visitation would have brought "to their doors."

In *Clerkenwell*, Mr. George Glover states, that the Guardians "utterly disregarded" the recommendations of the President of the General Board of Health; that "from the first there was an openly "expressed determination not in any way to be interfered with by "the Board. The inspector was treated with discourtesy, and the

" district medical officers and their recommendations were regarded " with contempt."

During the cholera of 1849 the parish of *Bethnal-green* lost 789 of its inhabitants, and when it was inspected by Mr. Glover in the middle of the late epidemic, it had no house-to-house visitors; no house of refuge for the working classes except the Union Workhouse; the only dispensary relief for a population of above 90,000 was afforded by an arrangement with one public dispensary. This was in reality all the preparation for the epidemic that had been considered necessary, and there was no organization for saving life in the event of the disease extending its ravages. " The authorities," says Mr. Glover, " practically did nothing, although promising almost everything."

As a contrast to the neglect of duty on the part of the authorities of Bethnal-green, Mr. Glover states, that the precautions adopted in the parish of *Islington* were highly satisfactory from the beginning, and that the necessary measures were taken by the parish of *St. George-in-the-East* with great readiness, although none had been adopted before the middle of the epidemic.

The parish of *Shoreditch*, which suffered so severely during the epidemic of 1849, escaped this year with less than one-third of the mortality. In 1849 the deaths amounted to 789, and the great bulk of the mortality took place within comparatively small limits. It seemed likely that the local authorities in this case would have profited by the calamity which formerly befel this parish, and that active measures would have been adopted.

Dr. Richard King inspected the parish when the epidemic had arrived at its maximum, and reports as follows:—

" There is no house-to house visitation; neither a day nor night dispensary, nor any depôt of medicines whatever; not a single notice has been printed to inform the poor of the addresses of the only four officers who are thus silently entrusted with the important charge of administering to the population labouring under diarrhœa, as well as isolated cases of cholera. Not one of the medical officers has even been asked to make a return."

Dr. Glover states that on his first inspection the parochial authorities of *Rotherhithe* were found to have empowered the medical men to call in additional assistance, but they had not done so. There were no house-to-house visitors,—there were no dispensaries,—in fact, no provision had been made for the impending epidemic, and there was no accommodation for cholera cases. Various suggestions were made to the Rotherhithe authorities, backed by the special recommendation of the President of the General Board of Health, and Dr. Glover reports the result to have been that the *Guardians positively refused to do anything.*

At *Deptford* there was one dispensary, and three druggists had been appointed to supply medicines night and day. There was no inspector of nuisances, no house of refuge, no house-to-house visitors, and the medical attendance was deficient.

At *Greenwich* there was no house-to-house visitation, the Guardians alleging that the cholera was declining. There was no inspection of

nuisances, and there appeared to be no attempts made to abate them. There was no house of refuge, and the medical attendance was insufficient. There was no accommodation for cholera cases. Suggestions were made for remedying all of these defects; but, notwithstanding the urgency of the matter, Dr. Glover reports, that "not one of the "propositions was carried out at the time, although after some delay, "at the expiration of weeks, they were partially or in whole carried "out."

Dr. Glover says that the mode in which necessary measures for the protection of the public health are evaded, "is a striking example "of the penny wise and pound foolish system. The orphan children of "those dead of the cholera received into the union workhouse at "Greenwich alone, I am informed, will cause the union an expenditure "of £700 a year."

At *Woolwich* the Local Board of Health appointed house-to-house visitors from the first.

Mr. Patterson states in regard to *St. James, Westminster*, that at his first meeting with the parochial authorities, in the very midst of the frightful outbreak of cholera in that parish, he "was astonished to find that little or no preparation had been made." They usually have one medical officer to attend their poor, and two others had been recently appointed, but there was no organization such as that laid down in the Instructional Minute. This parish, however, under the pressure of the epidemic, adopted the necessary measures, but too late.

Dr. Greenhow thus describes the preparations he found had been made when he began his inspection of his districts. "There was," he says, "no systematic inspection of the houses occupied by the poorer "classes in epidemic localities. No houses of refuge for the temporary "accommodation of the healthy inhabitants of infected places. With "the single exception of Newington, wherein house-to-house visitors "and dispensaries had been agreed to and appointed the day before, "but were not in full and active operation till the 12th September; "no system of domiciliary visitation for the purpose of detecting and "curing the disease in its earliest stage; and lastly, no efficient "system of supervision by a medical superintendent or otherwise to "direct and vary, as circumstances might render necessary, such "imperfect and inefficient measures as were in force."

Although the Boards of Guardians had not adopted the recommendations of the General Board of Health in their integrity, some little addition had been made to their usual medical relief. An additional medical officer was appointed at Newington in one of the worst localities, and a most efficient system of inspection of the inmates was put in operation in the workhouse, by which from 160 to 180 cases of diarrhœa were discovered and treated, the result being, that, notwithstanding the unhealthiness of the locality, and the extreme severity of the epidemic in the district, only two deaths from cholera took place in the workhouse, one being that of a bedridden person, and the other case had contrived to evade the regulations.

In *St. Saviour's Union* the medical officers were authorized to call in casual medical assistance, but did not avail themselves of it, although they had on some days upwards of 100 fresh cases of diarrhœa to attend, in addition to cases of cholera. St. Saviour's Board, however, appointed a medical sanitary inspector and an assistant, by whose exertions much good was effected.

Dr. Greenhow further states, that in *St. George's parish* no additional medical assistance had been directly provided, the same objectionable system having been pursued as in St. Saviour's, namely, that of authorizing the existing medical officers to provide assistance, the Board of Guardians thus throwing the responsibility off their own shoulders to those of the medical officers, and that without any arrangement as to the amount of remuneration for the extra anxiety and expense to be incurred.

In *Chelsea* he found that "two assistant medical officers had been "appointed to relieve the regular medical officers, and to act as house-"to-house visitors, a combination of incompatible duties which "resulted in the almost entire neglect of the latter."

The imperfect and inefficient measures found in operation, and the delay in adopting more active proceedings, appear to have arisen from a mistaken sense of duty to the ratepayers, and from members of different Boards of Guardians being themselves occasionally large owners of cottage and other property.

"Such members often attend most diligently all meetings, and thus acquire an influence which overpowers that of the better disposed, who probably in all cases constitute the majority."

Dr. Greenhow states, that although the measures he found in operation were extremely defective, the recommendations of the President of the General Board of Health, made through his medium, were courteously received, and for the most part ultimately adopted, but that arrangements made during the height of the epidemic, were necessarily extremely defective. "I fear," he says, "many lives "that might otherwise have been saved, have on this occasion been "sacrificed by the absence of more systematic arrangements."

The number of house-to-house visitors was in every instance insufficient.

Dr. Greenhow says, that "there can be no doubt that in many "cases, orphans and widows, unnecessarily rendered such by the "dilatoriness of Boards of Guardians, will constitute a heavy burden "upon the ratepayers for several years to come."

The result of the whole inquiry, as regards the administration of the sanitary and medical relief measures by the Boards of Guardians, is that, generally speaking, they were inefficient in character and extent, except in some of the larger and more healthy parishes, where they were least wanted. The experience in this respect is essentially the same as that obtained during the cholera of 1849, and it demonstrates that some more suitable local authorities, with adequate powers for carrying out permanent sanitary works and measures, and for providing the working classes with adequate medical relief

during seasons of pestilence are absolutely necessary for the metropolis.

Section V.

Causes of the defective Administration of Sanitary and Medical Relief Measures.

In considering this part of the subject, it is of importance to remark that the duties devolving on Boards of Guardians under the Nuisances Removal and Diseases Prevention Act, and the regulations of the General Board of Health, are not solely and specially the protection of the parish poor from cholera. These Boards appear to have been invested with the office of guardians of the public health mainly to avoid the necessity of erecting new local authorities, and because, to a certain extent, machinery which might be used for protecting the public health was already in their hands.

Let us next inquire on what classes of the community the force of the epidemic chiefly fell, in order that we may be able to form an estimate of the extent of protection against its ravages that was likely to be afforded by the administrative authority.

The statistics of the late epidemic are not so far complete as to afford accurate information on some points, but, from an examination I have made of the returns, I am of opinion that the weight of the epidemic of 1854, like that of the cholera of 1849, will be found to have fallen neither on the paupers nor on the richer classes of the community.

The deaths from cholera in the metropolis during the epidemic of 1849 were 14,590. Of these 329, or little more than 2·2 per cent. were gentry, 1,989 or 13·6 per cent. were tradesmen, and 10,332 or 60·8 per cent. of the total mortality fell to the lot of mechanics and their families; 1,940 or about 13·2 per cent. were undescribed.

It thus appears that, practically, the present state of the law vests the protection of the working classes and small tradesmen during periods of pestilence in the hands of the Poor law Guardians, while the chief localizing causes of pestilence have been already shown to be those requiring a totally different authority to deal with them.

Boards of Guardians, however willing, cannot sewer a street or drain a house. They cannot pave a court or control the water supply; all they really can do, is to enforce partial cleansings, and removal of nuisances, very useful no doubt if fully carried out, but requiring the Guardians to interfere with each other's interests or properties, or to place themselves in antagonism with other local authorities.

Again, when cholera is actually present, it comparatively spares their paupers, and carries off the working classes and small tradesmen, who detest parish assistance in all forms; and yet the only medical care exercised over these classes is that of the parish doctor. The dispensary is a parish dispensary. The house of refuge, one of the most important of all the preventive measures, is the parish workhouse, within which is also the parish hospital.

In *St. Giles* and *St. George, Bloomsbury,* the deaths from cholera in 1849 were 285, and the deaths from the epidemic of 1854 were 116, while the parish authorities state in their report that, "Amongst "the known paupers no fatal case has occurred, either in the poor-"house or on any of the parochial relief boards. In 1849 there were "very few fatal cases amongst the poor receiving relief; in 1854 not "one." I have reason to believe that the sanitary condition of the parish poor is considerably better than that of the working classes generally.

The incompetency of the existing local administration to deal with the epidemic immediately arrested the attention of the Inspectors who have had the worst districts of the metropolis.

Mr. Walsh points out as the result of his experience how unfit the guardians of the *poor* are to be the guardians of the *people* in a matter so important as the public health. "They are," he says, "the guardians of the *poor* against starvation and sickness, and the "guardians of the *rates* against all except the poor. Their functions "are instinctively *exclusive* not *inclusive.*"

Dr. Mortimer Glover says, in reference to the prevention of cholera, "I think my report offers sufficient evidence of the incom-"petency of Boards of Guardians in general to work a measure of "public health." In such a case as New-street, Deptford, where a very frightful outbreak of cholera occurred, he doubts whether any sanitary improvements short of the entire destruction of the property and the erection of model lodging-houses on its site, would remove the existing causes of epidemic disease. He says, "until the root "of the matter is gone into, and until the powers of the General "Board of Health are extended, or some similar central Board "has the power to compel local authorities to adopt remedial "measures, or until there be some Local Board acting under the "supervision of a central authority, nothing effectual to remedy "the existing evils will be done."

Dr. Greenhow, while remarking on the neglect of precautionary measures by the Boards of Guardians, points out that these bodies are elected for the express purpose of performing totally different duties from those devolving upon them under the Nuisances Removal and Diseases Prevention Act, that "parsimony is regarded as the one "grand virtue; hence when they are elected they conceive themselves "called upon to resist every unusual expenditure, and to cut down "the ordinary outlay to the lowest possible amount."

That this dilatoriness and false economy are exercised at a period when promptness, method, and extra expense are especially called for, and that however convenient it may be to employ the Guardians as authorities elected by the ratepayers, the doing so is entirely at variance with the efficient administration of sanitary laws especially during a severe epidemic visitation.

Dr. Greenhow further points out that notwithstanding the great sanitary evils at present existing in the parishes under his inspection, there is in reality no authority competent to deal with them. The whole sanitary administration is in a state of chaos. There is a

multiplicity of authorities with ill-defined duties—water companies, paving boards, cleansing boards, commissioners of sewers, district surveyors, boards of guardians, &c.—and it is no unfrequent occurrence to find the administrative authority of some of these Boards in the hands of parties directly interested in the continuance of the present state of matters. The practical result is that the great majority of the population of these large districts of the metropolis are left without any adequate protection against the ravages of epidemic or other preventible diseases. The evil unquestionably exists, but the remedy has yet to be provided, for no systematic supervision over the sanitary state of the metropolis is in existence.

The mischief arising from the owners of a bad class of property getting elected on Boards of Guardians and using their influence at the Board to compound for the rates on their own property is also forcibly pointed out.

Dr. Greenhow also shows that in no part of the metropolis except the City of London, which like Liverpool and a few other towns has an officer of health, is there any officer conversant with the effect of local influences on the health of the population, and hence all the sanitary measures adopted are imperfect. Dr. Hassall also states his opinion that a well organized staff of officers of health is indispensable for the metropolis.

In these opinions, as to the necessity of officers of health, which are also shared by the other inspectors, I entirely agree. The diseases of towns depend, like those of the human body, on a variety of concurring causes, evidencing the extent and nature of their operation by distinct symptoms in the inhabitants, recognizable by those who are specially conversant with the subject. So-called sanitary improvements carried out in the absence of the necessary knowledge of the effects of those local conditions which they are intended to remedy, may be in any case, as they have been in many cases, mere empiricism and waste of money. And this can only be avoided by making use of the assistance of qualified officers of health.

Section VI.

Effects of Sanitary Improvements in preventing Attacks of Cholera.

Having in the preceding pages indicated the chief removable causes of the localization of epidemic cholera in the metropolis, and the defects in existing powers and authorities, I shall conclude this report by adducing some examples of the result of sanitary improvements already in operation, as they are given in the reports of the medical inspectors.

Referring to the Borough, Dr. Greenhow states that, although the cholera deaths have in general been fewer than in 1849, the greatest diminution has occurred in the parish of Christchurch, and in the London road district of St. George's, both of which have been considerably improved, as regards their sanitary condition, since 1849.

The water supply has been improved, and is now the purest in the metropolis. The back streets, courts, and alleys, although very far from being in a good condition, have been greatly amended. Pes-

tiferous ditches have been covered, and many cesspools have been closed over and filled up, the open privies having been converted into trapped waterclosets. All of these sanitary improvements have doubtless been attended by a diminution of the intensity of the epidemic.

In the other districts of St. George's parish, and also in some parts of St. Mary, Newington, local improvements have been carried out, and have been attended with a corresponding diminution of mortality.

So far as could be observed, the severity of the epidemic bore a tolerably correct ratio to the neglect of sanitary measures.

As an illustration of immunity from attacks of cholera following on improvements, Dr. Greenhow mentions a district in St. Saviour's which used to be traversed by an open ditch. The houses along this ditch suffered severely from cholera in 1832, and again in 1849. The ditch has been covered since that date, and the neighbourhood escaped entirely during the late epidemic.

A similar result was obtained by covering one of these ditches which ran behind Wagstaff-buildings, St. Saviour's.

Jackson-court, St. Mary, Newington, suffered from cholera in 1849, but was improved shortly before the late epidemic. The court, houses, and yards were well lime-washed, and the landlord sent some chloride of lime to each house, to be used as a disinfectant. The neighbourhood was severely visited with cholera, but these houses escaped.

Bull's-gardens, Chelsea, consists of a double row of cottages. Until recently an open ditch, receiving the sewage of the houses, ran through this place, and terminated in the Ranelagh sewer. In 1849, there were 70 cases of diarrhœa, 25 of cholera, and 12 deaths among the inhabitants. Since then, the ditch has been converted into a sewer, and the privies and sinks have been connected with it. Although there is still ample room for sanitary improvement, as is evidenced by the occurrence of diarrhœa in the houses, there has been no death from cholera.

Mr. Walsh states that Jacob's Island, Bermondsey, and its immediate neighbourhood, suffered much less during the late epidemic, notwithstanding its greater severity, than it did during either of the two former visitations, which, he says, is attributable without doubt to the filling up of the foul tidal ditch since the epidemic of 1849.

Dr. Greenhow gives the following examples of sanitary improvements:

Exeter-buildings, Chelsea was formerly notoriously unhealthy, and a focus for epidemic disease. The neighbourhood has been opened up, the privies trapped and flushed daily, the court-yards and interiors of the houses were all lime-washed by the landlord, in anticipation of the cholera. These houses escaped the disease.

St. Mark's College, Chelsea, which is thoroughly drained with pipe drains, and is otherwise in excellent sanitary condition, escaped the epidemic entirely. There was less diarrhœa among the 107 inmates than the usual autumnal average.

The Duke of York's school, Chelsea, is kept in excellent sanitary condition. It contains altogether about 470 inmates; about 30 of these had diarrhœa, but there was no case of cholera.

The Normal school of the British and Foreign School Society, Borough-road, in the midst of an epidemic district, has its sanitary arrangements well attended to, and enjoyed an entire immunity from cholera.

In St. George's, Southwark, are two sets of almshouses, close to Great Suffolk-street. The sanitary arrangements of these houses are far from being perfect, but they are much better than those of the neighbourhood. All the inmates escaped the disease except one, who had been sleeping in an infected part of Kennington, and took cholera immediately on her return.

In Norfolk-street, St. Saviour's, situated in a neighbourhood where there was a great deal of disease, some dwelling-houses were erected on an improved system so as to accommodate 15 families. The sanitary arrangements are tolerably good, and there was no cholera and very little diarrhœa among the inmates.

There is a similar set of improved dwellings in Union-place, Chelsea, occupied by 12 or 13 families. There was cholera directly opposite, but there was no disease except a few cases of diarrhœa in these houses. It is enough to account for the diarrhœa that the Ranelagh sewer passes at no great distance from the houses.

Lambeth-square.—After the decline of the cholera, the President of the General Board of Health directed Dr. Fraser to make an inspection and inquiry into the condition of Lambeth-square, to ascertain to what extent the epidemic had prevailed among the population. This inquiry was directed in consequence of certain improvements in drainage having been carried out, subsequent to the epidemic of 1849.

Lambeth-square is situated in the Lower Marsh, Lambeth, not far from Westminster Bridge-road. It contains 35 well-built eight-roomed houses, renting at about 26*l.* a year each, and inhabited by a better class of artizans. At the period of the cholera of 1849, four only of the houses had waterclosets, the remainder having privies, placed over open brick drains in small back yards close to the house doors. The filth from these receptacles was conveyed away by a drain, common to five houses, passing under the middle house to a sewer in front. The smells from those privies were described as being unbearable. In addition to these causes of pestilence in the houses, there were nuisances all round the square. Close to the back walls of the house yards, there were the cesspools of houses in adjoining streets, an abominable filthy cow-yard, dung-heaps, stale fish and vegetables accumulated by costermongers, &c.

It is not surprising, therefore, that notwithstanding the comfortable circumstances of the occupants of these houses, six of them should have died of cholera during the epidemic of 1849.

Both before and subsequently to that year, the inhabitants suffered from various zymotic diseases, and also from a high average mortality. This was especially the case in 1851-52. During twelve months in

these two years, there were 80 attacks of typhus fever, scarlet fever, small pox, &c., and 24 deaths among a population of 434, being in the proportion of two cases of sickness to less than every 11 inhabitants, and one death to every 18 living.

In the beginning of 1852, a memorial was presented to the General Board of Health by the proprietor of the square, stating that for three years past the inhabitants had suffered from typhus fever, and that although 400*l.* per annum was being spent on repairs, drainage, and cleansing, the disease had reappeared. In twenty years the expenses incident to this condition of matters had been 1,250*l.*

A survey was made of the houses, and a complete system of pipe drainage with waterclosets was laid down for every house, at a cost of less than 200*l.* The smells in the houses immediately disappeared, and with them a large amount of sickness and mortality. Unfortunately, however the causes of disease around the houses remain as they were. Dr. Fraser states in his report that the people complain of the smells proceeding from the nuisances already mentioned, and hence the result of the improved house drainage, as indicated by improved health, is not so great as it might have been. The drainage came into operation in July 1852, and Dr. Fraser has given the following as the mortality in the square since July 1850.

Years.	Total Mortality.	Deaths from Zymotic Disease.
July 1850 to July 1851	9	3
July 1851 to July 1852	27	17
July 1852 to July 1853	8	1
July 1853 to July 1854	11	2

There was not a single death from cholera in Lambeth-square, during the late epidemic.

The time which has elapsed since the improvements is too short to afford reliable data as to the results, but as far as they go, they show a reduction of mortality of not much less than one-half in the two years succeeding the improvements, as compared with the two years which preceded, while the deaths from zymotic disease have decreased to nearly a seventh part of what they were.

Dr. Fraser mentions that other parts of this district of Lambeth have been improved in health, by the filling up of ditches, and in some cases by the substituting of waterclosets for cesspools.

One of the streets specially mentioned is Francis-street, with a population of 598, in which there were fourteen deaths from cholera in 1849. An open ditch passed close to this street at that period. The ditch has since been converted into a sewer, and the privies have been drained into it, while some of the houses have had waterclosets provided. During the late epidemic only one death from cholera took place in this street, and the case was one imported from Deptford.

Adjoining Francis-street is Hooper-street, in which no improvements have taken place in the privies and cesspools. In this street

there had been eight deaths from cholera at the period of Dr. Fraser's inspection.

The discontinuing of interments in the churchyard of St. John's, Waterloo-road, is also stated to have been followed by a decrease of disease and mortality in its neighbourhood.

The following facts from the report of Dr. Fraser and Messrs. Hughes and Ludlow, on the outbreak of cholera in St. James, Westminster, and St. Ann, Soho, may be adduced as additional illustrations of the beneficial effects of improved drainage:—

"Nos. 12, 14, 15, 16, 38, and 40, Marshall-street, and 25 and 28, "Broad-street, which had been efficiently drained into the new "sewer, had all escaped cholera, while, as our tables will show, the "surrounding houses had been severely visited."

The sanitary results of the regulation of common lodging-houses, under the Earl of Shaftesbury's Act, have been so remarkable that it appears necessary to make some allowance for imperfect information on the subject.

These houses used to be dens of filth, disease, and crime, until put under the inspection of the police. Since then over-crowding has been put a stop to, and cleanliness and ventilation are enforced as far as practicable.

Mr. Grainger has shown that in a large unregulated lodging-house in Tindall's-buildings, Gray's Inn-lane, there were, in 1849, fifteen or twenty cases of cholera, and that in thirty lodging-houses in St. Giles' there were twenty-eight deaths from cholera in the same year.

Under the Common Lodging-houses Act, the police have made returns of cases of epidemic disease occurring in houses under their inspection, from which it appears that between the 1st of January and the 1st of October 1854, there were reported twenty-six deaths from cholera, in the registered lodging-houses of the metropolis, the estimated population being 32,000, and in the lodging-houses not registered, but under inspection, there were thirty-five deaths from cholera reported among a population estimated at 50,000. If ample allowance be made for unreported deaths from cholera, there will still remain sufficient proof of the great sanitary improvement that has been effected by the Act.

The parochial authorities of *St. Giles and St. George, Bloomsbury*, state that in their parishes the Common Lodging-houses Act "has effected an amount of good which can scarcely be exaggerated," but they are desirous that its powers should be extended.

Mr. Walsh states that, in the districts under his inspection, the beneficial effects of the Common Lodging-houses Act were marked, and that in the registered lodging-houses even in the worst districts the state of the privies was very much superior to what it was almost universally in the neighbourhood in a much better class of streets and houses. He says, "It is a fact that exceedingly few cases of cholera occurred in registered common lodging-houses."

If we now turn to the improved dwellings and model lodging-houses of the metropolis, we shall obtain results equally striking and satisfactory.

In the newly constructed model dwellings and lodging-houses, all the evils and neglects existing in the same class of dwellings in other parts of the metropolis are as far as possible avoided.

There are neither cesspools, ashpits, nor nuisances; all the houses have waterclosets; and there is an abundant water supply, and suitable means of ventilation are provided.

The same improvements have been extended to the altered houses as far as it was practicable, and the results as regards the late epidemic cholera, for the seven establishments belonging to the Society for the Improvement of the Dwellings of the Labouring Classes, are thus stated in a communication received from the secretary.

1st. Model-houses for families, Streatham-street, Bloomsbury, 53 families, numbering 306 inmates, amongst whom six cases of diarrhœa have occurred, all of which speedily yielded to medical treatment.

2d. Thanksgiving model-buildings, Portpool-lane, Gray's Inn-lane, 26 families, and 66 females, or 166 inmates. Not a single case of sickness.

3d. Model-buildings, Bagnigge-wells, 23 families and 30 aged females, or 175 inmates. Not one case of sickness.

4th. Model lodging-house, George-street, St. Giles', 104 inmates, without a case of either disease.

5th. Model lodging-house, Charles-street, Drury-lane, 82 inmates, five cases of diarrhœa, very slight, and these were confined to men employed in the neighbourhood of the Tower and docks, and returned unwell. One case of cholera occurred, which can hardly be said to have been contracted in the house, as the individual had suffered from 19 days neglected diarrhœa, and was in a state of great destitution He died at King's-college hospital.

6th. Model lodging-house, King-street, Drury-lane, 25 inmates, not a case of either disease.

7th. Hatton-garden chambers, Hatton-garden, 28 inmates, but having accommodation for 58. No sickness whatever.

The houses numbered 4, 5, 6, and 7 are for single men.

Mr. George Glover, who was requested by the President of the General Board of Health to inspect the model lodging houses of the metropolis after the decline of the epidemic, has reported in regard to the buildings belonging to the Metropolitan Association, that in the Old Pancras-road buildings, containing a population of 693 persons, there was no cholera, but a few slight cases of diarrhœa, only four of which required medical treatment

In the Soho chambers, with an average nightly population of 88, there was no cholera during the epidemic, and only seven cases of diarrhœa. This house is situated in the immediate vicinity of the houses so frightfully visited by cholera in the parish of St. James, Westminster.

In the premises in Pelham-street and Pleasant-row, with an average population of 120, there have been no deaths either from cholera or diarrhœa.

In the Albert-street chambers, Spitalfields, a lodging-house with

an average population of 200, there were three cases of diarrhœa and two cases of cholera. One of the cases, however, was taken ill in Smithfield market and was removed to the London hospital, where he recovered.

The other case, which proved fatal, took place in a man lodger who ate stale crab, offensive to the smell, for supper and breakfast, and fell a victim to an error of diet which no improved sanitary condition could neutralize.

In Albert-street dwellings for families, containing 354 inhabitants there were three slight cases of diarrhœa, but there were four deaths from cholera, all confined to one family, which shows that there must have been some peculiar cause at work in that one case.

This family consisted of a man, his wife, and eight children, who occupied a house of three small rooms, which allowed only 276½ cubic feet of sleeping space for each individual. Now experience has shown that during cholera epidemics, about 500 cubic feet are required for safety. Mr. Glover considers it probable that inefficient nourishment had also much to do with the attack.

Besides the model dwellings belonging to the two societies, there is a street of 80 tenements, in St. Georges in the East, built on the plan proposed by His Royal Highness Prince Albert, and shown in Hyde-park, at the Great Exhibition of 1851. They occupy the site of some property the inhabitants of which suffered most severely from cholera in 1849. These dwellings contain a population of about 450, and they all escaped the epidemic.

The experience so far as concerns the results of sanitary improvements is most satisfactory, although it also shows that other things require to be attended to in order to ensure security from epidemic disease.

Section VII.

Conclusions.

The facts in the preceding report appear to me to warrant the following conclusions:—

1. The chief causes which have localized epidemic cholera during the late and previous epidemics are known and removable.

2. However beneficial any temporary sanitary measures may be, such temporary measures are not enough to ward off attacks of pestilence, and that permanent sanitary works and arrangements are necessary.

3. That there is no local authority except in the city of London having the necessary powers for executing permanent works, and that new local authorities with adequate powers are requisite for the public safety.

4. That such new local authorities, besides carrying forwards the permanent sanitary improvement of the metropolis, should be intrusted with powers, under supervision of the General Board of Health, for providing houses of refuge, house to house visitation, and other similar measures required for the protection of the working-classes during extraordinary seasons of pestilence.

TABLE I.

Weekly Statistics of MORTALITY from CHOLERA, DIARRHŒA, and other Zymotic Diseases during the Epidemic of 1854.

Weeks ending	Cholera.	Diarrhœa.	Typhus.	Zymotics.	All Causes.
January 7	2	22	43	284	1,444
„ 14	2	27	49	280	1,492
„ 21	1	27	44	253	1,195
„ 28	0	30	51	230	1,178
February 4	1	31	42	263	1,204
„ 11	1	20	53	262	1,178
„ 18	0	24	47	248	1,154
„ 25	0	28	50	257	1,334
March 4	0	20	31	215	1,135
„ 11	0	19	52	254	1,343
„ 18	0	22	39	217	1,188
„ 25	0	22	41	246	1,200
April 1	0	16	40	245	1,489
„ 8	0	22	47	264	1,149
„ 15	2	18	59	254	1,087
„ 22	2	26	46	298	1,193
„ 29	0	19	56	289	1,211
May 6	0	25	51	303	1,263
„ 13	0	10	47	252	1,093
„ 20	2	17	56	301	1,188
„ 27	0	31	43	282	1,143
June 3	2	22	57	309	1,090
„ 10	1	31	64	306	1,110
„ 17	1	31	61	287	1,085
„ 24	1	38	63	301	1,153
July 1	0	25	47	249	1,290
„ 8	1	32	44	253	984
„ 15	5	46	51	270	1,015
„ 22	26	58	43	293	1,008
„ 29	133	84	40	422	1,219
August 5	399	142	44	731	1,456
„ 12	644	195	53	1,069	1,832
„ 19	729	192	45	1,112	1,833
„ 26	847	214	54	1,296	2,039
September 2	1,277	243	51	1,732	2,515
„ 9	2,050	276	67	2,558	3,413
„ 16	1,549	232	58	2,026	2,836
„ 23	1,284	190	71	1,717	2,504
„ 30	754	165	57	1,144	2,216
October 7	411	98	88	777	1,532
„ 14	249	102	53	610	1,394
„ 21	163	78	58	495	1,321
„ 28	66	46	53	371	1,228
November 4	31	33	62	359	1,252
„ 11	23	35	54	309	1,160
„ 18	12	31	54	332	1,309
„ 25	8	21	47	332	1,262
December 2	7	19	52	298	1,350
„ 9	5	19	49	328	1,331
„ 16	2	25	52	330	1,300

Table II.

Showing the comparative Mortality from Cholera during the Epidemics of 1832.* 1849 and 1854, for each Parish and Union in the Metropolis.

Unions and Parishes.	Epidemics of Cholera.								
	1854.			1849.			1832-33.		
	Population 1851.	Dths.	Deaths per1,000	Population 1849.	Deaths.	Deaths per1,000	Population 1831.	Deaths.	Deaths per1,000
Paddington	46,305	93	2.0	41,267	35	0.8	–	–	–
Kensington and Brompton	44,053	186	4.2						
Hammersmith	17,760	117	6.0	68,425	225	3.3	52,981	52	1.0
Fulham	11,886	93	7.7						
Chelsea	56,538	297	5.2	53,379	247	4.6	32,371	272	8.0
St. George, Hanover-sq.	73,430	294	4.0	71,672	131	1.8	58,209	74	1.0
St. John and St. Margaret, Westminster.	65,609	420	6.4	64,109	437	6.8	–	–	5.0
Westminster	–	–	–	–	–	–	85,220	450	5.0
St. Martin-in-the-Fields	24,640	58	2.3	24,557	91	3.7	23,970	–	0.02
St. James', Westminster	36,406	484	13.0	36,426	57	1.6	–	–	–
Marylebone	157,896	344	2.1	153,960	261	1.7	122,206	355	3.0
Hampstead	11,986	14	1.1	11,572	9	0·8	8,588	–	–
St. Pancras	166,956	240	1.4	160,122	360	2.2	103,548	230	2.0
Islington	95,329	94	0.9	86,761	187	2.2	37,316	39	1.0
Hackney	58,419	71	1.2	55,152	139	2.5	34,527	8	0.2
St. Giles and St. George, Bloomsbury	54,214	116	2.1	54,062	285	5.3	52,907	280	5.0
Strand	44,460	109	2.4	44,254	156	3.5	42,015	26	0.06
Holborn	46,621	25	0.5	46,134	161	3.5	42,696	46	1.0
Clerkenwell	64,778	58	0.9	63,499	121	1.9	47,634	65	1.0
St. Luke	54,055	50	0.9	53,234	183	3.4	46,642	118	3.0
East London	44,406	85	1.8	43,495	182	4.5			
West London	28,790	125	4.3	28,829	429	9.6	123,608	605	5.0
City of London	55,932	71	1.2	55,816	207	3.8			
Shoreditch	129,257	238	1.8	104,122	789	7.6	68,564	57	1.0
Bethnal Green	90,293	190	2.1	87,263	789	9.0	62,018	345	5.0
Whitechapel	79,759	329	4.0	78,590	506	6.4	64,141	736	11.0
St. George's-in-the-East	48,376	154	3.0	47,334	199	4.2	38,505	123	3 0
Stepney	110,775	381	3.4	106,988	501	4.7	72,442	358	5.0
Poplar	47,182	208	4.0	44,103	313	7.1	25,066	101	4.0
St. Saviour's, Southwark	35,731	492	13.8	35,227	539	15.3			
St. Olave	19,375	313	15.6	19,278	349	18.1	91,501	1,128	12.0
St. George, Southwark	51,824	543	10.4	50,900	836	16.4			
Bermondsey	48,128	838	17.0	45,500	734	16.1	29,741	210	7.0
Newington	64,816	694	10.6	63.074	907	14.4	44,526	200	4.0
Lambeth	138,325	932	6.7	134,768	1,618	12.0	87,856	337	4.0
Wandsworth	50,764	421	8.0	48,446	484	10.0	33,090	46	1.0
Camberwell	54,667	553	10.0	51,704	504	9.7	28,231	107	3.0
Rotherhithe	17,807	284	15.7	17,208	352	20.5	12,875	19	1.0
Greenwich	99,365	567	5.6	95,954	718	7.5	63,564	149	2.0
Lewisham	35,835	75	2.0	32,299	96	3.0	18,426	–	–

* I have copied the data for the epidemic of 1832-3, from Mr. Grainger's report on the cholera of 1849, with the same reserve he makes, namely, that it is only an approximation, on account of the imperfection of the records.

Table III.

Total number of Cases of Diarrhœa and Cholera returned to the General Board of Health, as having been treated in the following Parishes and Unions during the Epidemic of 1854.

Union or Parish.	Diarrhœa.			Cholera.			
	Dispensar.	Medical Officers.	Visitors.	Dispen-	Medical Officers	Visitors.	
Lambeth	–	3,364	–	–	427	–	
East London	–	1,514	–	–	53	–	
St. Luke, Middlesex	152	121	–	–	12	–	
West London	–	951	–	–	13	–	
Shoreditch	–	1,729	–	–	105	–	
Bethnal Green	–	409	–	–	65	–	
Hackney	–	716	–	–	16	–	
St. James, Westminster	–	2,601	–	–	237	–	Including cases discovered by house-to-house Visitors.
Strand	–	4,336	–	–	43	–	
Islington	–	2,895	–	–	67	–	
Camberwell	2,211	5,919	–	–	305	–	
St. Saviour's	924	432	338	15	102	81	
Bermondsey	256	117	30	–	39	–	
St. Luke, Chelsea	–	2,564	1,323	–	146	15	
Whitechapel	1,396	1,409	163	26	137	30	From 10th August to 23d October. First Visitor's Return on 15th Sept.
St. Mary, Newington	394	3,569	949	4	341	77	August 8th to October 7th. First Visitor's Return on 16th Sept.
St. George the Martyr	–	984	410	–	70	12	
Fulham	–	1,670	487	–	449	70	August 5th to October 1st. First Visitor's Return on 11th Sept.
Stepney Union	4,463	1,563	2,584	–	311	140	
Poplar Union	4,577	4,000	1,322	–	435	56	
St. Giles and St. George, Bloomsbury	–	4,061	–	–	120	–	Including cases discovered by house-to-house Visitors.
Holborn	–	2,600	–	–	38	–	

APPENDICES.

Instructions to Local Authorities on Preventive Measures in relation to Epidemic Cholera, under the Nuisances Removal Acts.

The main object of the Board in framing the accompanying Instructions has been to embody, in a form adapted to practical use, the results of experience as to the best means of meeting an outbreak of epidemic cholera.

One of the preventive measures recommended by the Board—that denominated "House-to-house Visitation," is based on the belief entertained by the medical profession, that by treating every case of diarrhœa which may be discovered among the population of a town or district visited by cholera, the ravages of this fatal disease may be to a large extent mitigated. It is well known that where cholera is epidemic, diarrhœa, usually painless, almost always prevails very extensively; and it is also known that diarrhœa of the same character usually precedes—sometimes for a few hours, sometimes for several days—the alarming symptoms which constitute developed cholera. Now the prevalent diarrhœa, in a vast majority of cases, yields to remedial measures promptly applied; and it is believed that if they had been neglected, many cases of diarrhœa thus arrested would have passed into developed cholera. As long, therefore, as cholera shows itself so difficult of cure, every plan which proposes to deal with an outbreak of this fearful disease *must provide for the immediate treatment of all cases of diarrhœa.*

It may, perhaps, at first sight appear that in order to effect the proposed object it would be sufficient to impress the foregoing plain and obvious facts upon the public, by means of placards and notices; to provide dispensaries where the poor might be supplied gratuitously with the requisite medicines, and to leave the rest to the common sense of the people. But it must be remembered that diarrhœa is a very common disease; and when painless attracts little notice, or is regarded as of no consequence. It must further be borne in mind that the principal sufferers from epidemic cholera belong to a class whose habits of life are peculiarly calculated to render them unwilling to anticipate misfortune. They may, perhaps, be taught that the filth, intemperance, and wretchedness in the midst of which they so generally live, render them peculiarly susceptible

to the worst forms of any prevalent pestilence ; but unfortunately that which is the source of their danger is also the cause of their apathy. The trials which fill their thoughts are those of the day and of the hour. The pressing necessity of struggling with actual suffering begets generally a reckless indifference to merely contingent evils ; and thus it has been found that even when cholera is raging in an overcrowded alley or filthy undrained court, the poor inhabitants, neglecting the commencement of the disease (which it must be recollected is without pain), rarely apply for medical aid until the disease has reached that stage when medicine is all but unavailing.

As therefore experience has shown that the poor cannot in general be induced to seek medical aid in good time, it is of the utmost importance that medical aid should seek them. This object the Board propose to effect by the system of what is called house-to-house visitation.

The Board believe that the detailed exposition of this system about to be given will afford to local authorities all the information necessary to enable them, in their respective districts, themselves to carry it into efficient operation.

Circumstances may occur under which local authorities may stand in need of counsel, and possibly even of the temporary assistance of a medical officer of the Board. The Board will deem it their duty promptly to render such assistance, as far as may be in their power whenever real occasion for it may arise ; but it is equally the duty of local authorities resolutely to avail themselves of the means of preparation within their own power, and to place their dependence, not on Government aid, but rather on their own energy, vigilance, and foresight.

The instructions here given contain ample information as to the manner in which the preventive measures in general, and the house-to-house visitation in particular, may be best conducted, and as to the machinery by which it may be most successfully worked.

If the several Boards of Guardians and other local authorities throughout the country forthwith make the requisite preparation for enabling them to carry into effect, at a day's notice if necessary, the measures here recommended, according as these fall within their respective spheres of duty, every corner of the country will be furnished with a far more powerful protection against the visitation of cholera than any Government department, however vigilant and zealous, can possibly supply ; whilst the sense of security which will then pervade the entire community will strip the disease of half its terrors. On the other hand, if Boards of Guardians and other local authorities should neglect the plain and obvious duties hereby imposed upon them, they must bear in mind that the responsibility of all the suffering and loss of life which may be occasioned by such neglect, will, after this notice, attach exclusively to themselves.

Provisions of Nuisances Removal Act.

The Nuisances Removal and Diseases Prevention Act, 1848, includes two sets of provisions; the one permanent, the other put in operation by an Order in Council issued under the 9th section.

The instructions which follow refer entirely to the latter, as it is under that alone that the General Board of Health exercises any power by the Act for the prevention or mitigation of epidemic disease. In dealing with these instructions it should be understood,—

1st. That *all local authorities*, having by law powers for abatement of nuisances, are called upon by the regulations and directions of this Board actively to exercise those powers, and that Boards of Guardians act only in default of such local authorities. Besides local authorities, owners and occupiers, and all others having control of premises, are charged by the Board's regulations with duties of cleansing, &c., which the Guardians should make known by handbills circulated through the Union.

2d. That the word "Guardians" in the following instructions, includes all official bodies having the management of the poor.

3d. That the authorities for administering the Poor Law in England, Scotland, and Ireland have the same power of enforcing the duties imposed on Guardians by the Nuisances Removal Act, as they have of enforcing the duties imposed on them by the laws relating to the relief of the poor. (s. 12, Nuisances Removal Act, 1848.)

4th. That, for the execution of the instructions and directions of the General Board, the Guardians may appoint or employ officers, or persons in aid of their ordinary officers, and may defray the expenses incurred in execution of those regulations and directions out of the funds of their unions, parishes, or respective combinations (section 14, Nuisances Removal Act, 1848), or out of the parochial funds, without any order of justices, when the cost does not exceed 20*s*., and when it exceeds that sum, on an order of justices (or, in Scotland, of two justices, or of the sheriff or magistrates), (s. 8, Nuisances Removal Act, 1849.) The Guardians may thus exercise a discretion as to charging the cost on the parish or union fund.

They should be guided in this discretion by the extent of the evil and the origin of the nuisance. If the former be general, the cost of removal may properly be thrown on the common fund. If the latter be local, it would seem (unless the relief by removal of the nuisance be general) to be right to throw the expense on the parish.

5th. That Guardians and their officers, or persons authorized by them, may enter on any premises where there is ground for believing that necessity may exist or arise for executing the directions and regulations of the General Board of Health. (s. 13, Nuisances Removal Act, 1848.)

DUTIES of LOCAL AUTHORITIES (other than BOARDS of GUARDIANS), Owners, Occupiers, and Persons having Control of Premises.

1. *Cleansing of Streets and Public Places.*

All surveyors, district or assistant surveyors of highways, trustees, county surveyors, and others by law entrusted with the care and management of streets and public ways and places, and where there are no public authorities so entrusted, the owners and occupiers of houses and tenements adjoining thereto, are to take the measures necessary for the frequent and effectual cleansing thereof.

2. *Cleansing, Ventilating, &c. of Private Premises and Buildings.*

The owners and occupiers, and persons having the care and ordering of all houses, dwellings, churches, buildings, and places of assembly, are to cleanse, purify, ventilate, and disinfect the same.

3. *Removal of Nuisances.*

All local authorities and persons whatsoever are to exert all the powers vested in them by law for the removal of nuisances.

4. *Speedy Interment.*

All relations of, or others in charge of the bodies of persons who have died of cholera or other epidemic disease, are to obey the directions of the medical officers of the guardians, as to the speedy interment of the dead.

The word "Guardians," as here used, means the guardians, directors, wardens, governors, parochial board, or other like officers having the management of the poor of any union, parish, combination, or place where the matter requiring the cognizance of any such officers arises, and the expression "Local Authority" means the town council, local board of health, or any trustees or commissioners for the draining, paving, lighting, cleansing, managing or directing the police of any town, borough, or place, highway board, or any other body of a like nature, or any commissioners of sewers, or any body, excepting boards of guardians and overseers, having by law powers for the removal of nuisances.

The Guardians of the poor, as superintendents of the execution of the directions and regulations of the General Board of Health, have to perform two classes of service. The first relates to cleansing duties; the second, to duties of medical precaution and relief. Both should be entered upon before the epidemic actually appears.

CLASS I.—DUTIES OF GUARDIANS IN RELATION TO CLEANSING AND REMOVING NUISANCES.

1. *Lists of Epidemic Localities.*

Direct the Clerk to make out, or cause to be made out, from the medical officers' books or other sources of information, a list* of the

* The books of the medical officers will necessarily afford much information, but the experience of the relieving officers in the haunts of poverty and disease will likewise enable them to indicate dangerous localities. [The

places within the union, where cases of cholera, diarrhœa, typhus fever, or any epidemic or endemic disease are most commonly found.

Give the list or portions of the list relative to particular districts to the several district medical officers, and require them to visit the places within the districts named in such list, and any other places within it, and examine the houses situate in places where disease may be expected to appear, as to their present condition in respect to cleanliness, or as to any existing predisposing causes of disease likely to affect the inmates.

2. *Certificates of Places other than Private Premises requiring Cleansing.*

Direct the medical officers to certify in writing to the Guardians all such places as are in a state dangerous to health, or need frequent and effectual cleansing by way of preservation against disease, and such dwelling-houses as are in a filthy and unwholesome condition, and all such nuisances and matters injurious to health as ought to be cleansed, abated, and removed, in execution of the directions of the General Board.

Direct the medical officers to certify in writing all the streets, rows, lanes, mews, courts, alleys, and passages, and public ways and places in the union, under the care of town councils, local boards of health, commissioners, trustees or surveyors, which are in a state dangerous to health, or require frequent cleansing by way of precaution against disease.—(Appendix 2, F.)

Direct the medical officer to certify in writing all streets, rows, lanes, mews, courts, alleys, and any passages, public ways, or places to which any houses or tenements adjoin, not intrusted by law to the care or management of any town council, local board of health, commissioners, surveyors, trustees, or others, which are in a state dangerous to health, or require such frequent cleansing.—Appendix 2, F.)

3. *Enforcement of Cleansing under Certificates.*

Having received these certificates of the medical officers, ascertain who are the parties by law intrusted with the care and management of the streets and public places included in Certificate

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The records of past outbreaks of cholera, where they have been preserved, will point out the localities formerly affected, and the registry of deaths will indicate the localities which suffered most.

At Newcastle an important table has been prepared, showing the numbers of deaths from cholera in each street, &c., during the recent epidemic. There can be but few occasions which will not permit of similar tables being prepared.

Where there are dispensaries and hospitals which provide out-door attendance, the records of these institutions will likewise indicate the localities where disease ordinarily prevails.

By consulting these sources of information, the clerk, or the person specially appointed to perform his duty, will be enabled to compile a tolerably accurate list of the nests of epidemic disease.

No. 1; send them copies of the certificate, and require them, in obedience to the 5th direction of the General Board, "to see "to the effectual and continued cleansing of all streets, rows, "lanes, mews, courts, alleys, and passages, and public ways and "places under their respective care and management; and to "the removal of all filth, ordure, and nuisances therefrom," under a penalty, in case of default, not exceeding *5l.**

Warn, by printed notice, the inhabitants of the localities specified in Medical Certificate (App. 2 F.) that every occupier of a house or tenement adjoining these localities is bound by law to keep or cause to be kept sufficiently cleansed every part of the street, row, lane, mews, courts, alley, or passage, way or place, which adjoins the house or tenement occupied by him, under a penalty, in case of default, not exceeding *5l.**

The medical officer having, where necessary, directed how or with what precautions the cleansing shall be done, and the nuisances removed, will inform the inhabitants that it is farther required, by the directions of the General Board, that "works of cleansing, and "removal of filth, ordure, and nuisances required shall be done by "effectual washing or otherwise, and with the use of fluids or "substances for preventing the escape of noxious effluvia during "the operation, when the medical officer of the Guardians, or others "authorized to superintend the execution of these directions and "regulations shall prescribe the same."

Having thus notified to the proper parties the duties required to be done by them, proceed by yourselves or by your officers or persons already employed by you, or to be specially appointed by you for this purpose, to superintend and see to the execution of the foregoing directions and regulations in all places within your jurisdiction.

Having, in the execution of the previous duty, ascertained how far the directions of the General Board have been executed, it is your duty, in default of action by bodies or persons legally responsible, yourselves to cause the places included in both certificates to be effectually cleansed, and all nuisances to be removed therefrom.

4. *Proceeding for Penalty against Defaulters.*

In all cases where the default is culpable, and the parties guilty of it can be got at, proceed for a penalty not exceeding *5l.*, under the 16th section of the Nuisances Removal and Diseases Prevention Act, 1848. (11 & 12 Vict. c. 23.)

The preceding instructions relate entirely to out-door nuisances in streets and public places.

Those which follow relate to nuisances in houses and on private premises, and should be carried out at the same time as the pre-

* For the mode of recovering this penalty see Nuisances Removal Act, 1848, sec. 16

ceding duties, the inspector of nuisances guiding the attention of the medical officer where necessary.

As introductory to the duties which follow, it may be pointed out that, should any complaint of a nuisance under the permanent powers of the Nuisances Removal Act, signed as required by the Act, be preferred to any local authority having cleansing powers,* not being a Board of Guardians, the local authority may proceed at once in its abatement, under the Act, though an Order in Council be in force, and if such a complaint be made to the guardians, they may forward the complaint to the local authority, to be proceeded with under the Act, or if there have already been default on the part of the local authority, may themselves take proceedings, under the regulations of the General Board of Health.

In this case they cannot recover expenses incurred, but may proceed for a penalty under the 16th section of the Act of 1848.

Inspectors of nuisances should be required to make periodical returns of their inspections in books prepared for this purpose (see Appendix 2, F.), and should be furnished with all the necessary notices.†

It too commonly happens that persons are appointed inspectors of nuisances who have neither the physical nor the mental requisites for this really important office, which can hardly be filled efficiently (according to a proper conception of it) by any but a person of medical knowledge, while, for anything like satisfactory discharge of its duties, a good general education, business habits, and some practical knowledge of the simplest and most economical means of cleansing, deodorizing, ventilation, &c., are indispensable.

The inspector of nuisances should be thoroughly instructed by the legal adviser of the Board as to his powers and the forms of procedure.

Lime-washers should be employed to perform the work of lime-washing in a regular manner, until it is completed wherever required.

The lime-washing should be lime-washing strictly so called, and not whitewashing.

The lime should be applied as soon after burning as possible.

5. *Cleansing and Removal of Nuisances on Private Premises.*

Direct your inspector of nuisances to examine the houses in the district, and to make a list of all dwelling-houses in such a filthy and unwholesome state as to be a nuisance or injurious to health; and all drains, ditches, gutters, water-courses, privies, cesspools or ashpits, kept or constructed so as to be a nuisance or injurious to health; and all cases in which swine or any other animal, or

* That is, a town council, improvement commissioners, or board of guardians, as the case may be.

† Which may be procured of Mr. C. Knight, 90, Fleet Street, London, publisher to the General Board.

any accumulation of dung, manure, offal, filth, refuse, or other matter or thing are kept so as to be a nuisance or injurious to health, and to report the cases to you.

Give notice of all nuisances so reported to the owner or occupier, or person having the care of the premises, or person causing the nuisance (according to the nature of the nuisance), and require them forthwith to cleanse, whitewash, ventilate, or otherwise purify, as the case may require, such dwelling-house, or premises, or otherwise abate or remove the nuisance or matter injurious to health; and if *they neglect to do so, do the work yourselves*, and proceed against the defaulter for a penalty under the 16th section.*

Among these duties, that of enforcing ventilation is particularly important. The most fertile source of disease is the impure state of the air which results from the crowding of many persons within ill-ventilated rooms. *Not only in the dirty dwellings of the poor, but in union workhouses, other public establishments, and public lodging-houses, which present to the eye no appearance of dirt, and where drainage is not defective, the air often becomes unwholesome, from the great number of persons breathing in it, or from the means of ventilation being deficient.* In these cases, either the numbers of the occupants of the rooms should be much diminished, or a system of free ventilation should be at once introduced and enforced.

The vagrant wards of workhouses and low lodging-houses frequented by vagrants should be narrowly watched; for these are places in which cholera is apt to be fostered, and whence it may be disseminated widely amongst the surrounding population. In these establishments, then, the most scrupulous cleanliness and free ventilation should be maintained; and even the personal cleanliness of the inmates, as far as possible, enforced.

Class II.—Duties in relation to Medical Precaution and Relief.

The Clerk of every Board of Guardians on receiving copies of the present minute, should immediately send a copy to each of the medical officers of the Board, and to each of the relieving officers. He should also without delay procure such additional copies† as may be required to furnish each member of the Board of Guardians with one copy.

The Clerk should also, after a conference with the chairman of his Board, fix an early day for submitting this minute to a meeting

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* If an owner neglect to provide a privy or drain, or the nuisance arising from the want of either is due to the owner, the notice to remove it should be made on him. But if he have provided these, and the carelessness of the occupier have caused the nuisance, the notice should be served on the occupier.

† Any number of copies may be obtained by application in writing to Mr. C. Knight, 90, Fleet-street, at a trifling cost.

of the Board, and for taking into consideration the suggestions contained therein.

At such meeting the Board should direct the clerk to require each of the district medical officers of the Board to furnish him, as soon as possible, with a carefully prepared list, in duplicate, of the several localities, in their respective districts, which are the usual seats of fever or other sickness in ordinary seasons, and which generally suffer most severely on the occurrence of any prevalent epidemic.

The district medical officers should also be strictly enjoined to furnish the clerk with the earliest possible intelligence of the appearance of any case of cholera, or of disease of a choleraic character, within their respective districts, or of such a general prevalence of diarrhœa as may seem to indicate an approaching outbreak of the epidemic. At the same time the other resident medical men of the town or district should be requested to do the same; as it may happen that the earliest cases may not occur to the parochial medical officer.

At this meeting, measures should be taken to ensure the services of a sufficient medical staff to carry into effect, in case of need, the system of house-to-house visitation. This staff should consist of a medical superintendent, of medical officers, one or more, and of house-to-house visitors. With reference to the house-to-house visitors it may be sufficient, as long as there is no actual outbreak, to have ascertained where these can be obtained when required; but the selection of the medical superintendent and the medical officer or officers should be proceeded with at once. Not only should the selection of the requisite number of medical men for these services be made at the earliest possible moment, but the scale of remuneration for such services should be fixed, and means should be taken to ascertain whether the persons so selected would be ready at a day's notice, and on the proposed terms, to undertake the functions respectively assigned to them, and whether their services may be relied upon as transferable to any district or locality in which the disease may prevail.

By the timely adoption of this course, the Board of Guardians, on the appearance of epidemic cholera in any part of their district, will be enabled, without delay on the one hand, or undue precipitation on the other, to call into active service just so much of their previously constituted medical staff as may suffice to deal with the particular emergency.

Qualifications of Officers.—1. *Medical Superintendent.*

The medical superintendent should be a legally qualified and experienced member of the profession. It is desirable that he should be a resident within the jurisdiction of the Board of Guardians by whom he is employed, since that circumstance may have already furnished him with several important qualifications for his work;

as, for instance, an acquaintance with the localities affected; a familiarity with the habits of the resident poor; and a knowledge of the medical resources of each district.

It may happen that amongst the competent local practitioners none can be found whose private professional engagements will admit of his devoting himself entirely to the absorbing duties which during the prevalence of an epidemic, must devolve upon the medical superintendent. In this case, the Board of Guardians must endeavour to engage the services of a non-resident medical man.

Whenever the adoption of this course becomes a matter of necessity, it is especially important that the appointment should be speedily made, in order that the person engaged may have time to prepare himself for the efficient discharge of his duty on the first summons.

If a sudden outbreak of epidemic cholera should find a Board of Guardians unprovided with the services of a competent medical superintendent, the General Board will be prepared to recommend such an officer on receiving from the Guardians an application to that effect. Such an application may be made by telegraphic message, and it should distinctly specify the remuneration intended to be given.*

2. *Medical Officer.*

Whenever cholera becomes epidemic in any district of considerable extent, it will be found an economy of time and money as well as conducive to the prompt and proper care of the sick, to appoint a legally qualified practitioner, whose special duty it shall be to take the medical charge of the developed cases. As a general rule this should be the Union medical officer, who has to treat epidemics in ordinary seasons, and on whom therefore naturally devolves the medical treatment of the extraordinary epidemic. During the emergency, in large and populous places at least, the Union medical officer should be kept as strictly as possible to the performance of his usual duty, which is that of the care of the sick. For this reason he should have nothing to do personally with carrying into effect the visitation system, but should devote himself to the charge of the cases which the visitation discovers and sends to him. It is true that he may require assistance; and one of the first objects of the preliminary meeting should be to consider the amount of such assistance which must be given, and how it may be best supplied. The General Board would not of course venture to give Boards of Guardians any specific advice as to the *extra* remuneration which it would be right to allow the Union medical officer while performing this additional onerous duty. It may be well, however, to say that when medical men other than the parochial

* The remuneration hitherto given to medical men of the qualifications required, has been 3*l.* 3*s.* per diem, travelling expenses, and 15*s.* per night for hotel expenses. It may be observed that travelling and personal expenses will of course be saved by engaging the services of a resident medical man.

medical officers have been so employed, it has been usual to give them 31*s.* 6*d.* per day. If they should be brought from a distance, travelling expenses to and fro have been also allowed. In cases of pressing emergency, the General Board will promptly attend to any application which may be made to them for the services of qualified practitioners on the above terms.

3. *House-to-house Visitors.*

These gentlemen are usually selected from amongst junior medical practitioners, or the more advanced students in medical schools.

If there should be any medical schools, hospitals, or infirmaries in the neighbourhood of the outbreak, the requisite number of visitors will in all probability be obtained without difficulty from them. If, however, this should not be practicable, an application, by telegraph, to the General Board, stating the number required and the proposed scale of remuneration, will be immediately attended to. Visitors have usually been paid from 4*l.* 4*s.* and 5*l.* 5*s.* per week to 1*l.* 1*s.* per day. If brought from a distance they ought to be paid their travelling expenses to and fro.

Duties of Board of Guardians on the first intimation of the Approach of Epidemic Cholera.

As soon as the Board of Guardians have been warned, either that cases of cholera have occurred, that cholera has broken out as an epidemic in any part of their district, or that the unusual prevalence of diarrhœa renders such an outbreak *imminent*, the medical superintendent should be summoned to his post and should immediately obey the summons.

Preliminary Meeting of Medical Men.

On his arrival, the first step of the medical superintendent should be to call a meeting of the district medical officers and the medical practitioners of the neighbourhood. He should then explain that the object of the proposed arrangements is to furnish the poorer classes, who are likely to be the greatest sufferers from the epidemic, with such medical aid as private practitioners may be unable to supply; and that this object would, to a great extent, be frustrated if those arrangements were allowed in any way to interfere with the practice of private practitioners. It is most essential to insist on this point, and it would be well to engage that any interference with private practice on the part of any officer employed, would be followed by immediate dismissal.

The medical superintendent and medical officers should then consider and settle their combined plan of operations; the medical districts which should be included within these operations; the number of house-to-house visitors required for the special districts likely to be attacked, and for the several services; the propriety of establishing temporary hospitals for the reception and treatment

of the sick; the best sites for such hospitals, for houses of refuge, and for dispensaries; the medicines with which sufferers from diarrhœa should be supplied in the intervals which may elapse before the arrival of medical aid; the notices and placards which it would be desirable to circulate for the information of the people; the forms in which the statistical returns of the daily progress of the disease should be made and the times at which the medical superintendent, district officers, and visitors should meet.

A few suggestions on each of these points may be of use.

Districts.

The term "districts" is here used to denote the areas assigned to a given number of medical officers. The existing division of the parish or union into districts for ordinary medical relief should, as far as possible, be retained; and the districts and sub-districts included in the plan of operations should be such of the existing medical districts as may be either affected or threatened with cholera.

House-to-house Visitors.

The number of house-to-house visitors required in the various districts will, of course, depend on the number and extent of the epidemic localities, and on the extent to which the disease may actually prevail. The district medical officers and the resident medical practitioners ought to prepare themselves before coming to the meeting with the means of advising on this point.

Hospitals.

It will be right to provide some hospital accommodation not only for those who may be taken ill in the streets, or at a distance from home, but also for those who live in unhealthy places or crowded rooms. The hospitals should be well ventilated and well drained, and should be near the epidemic locality. Care should be taken to avoid any sites that may be near accumulations of refuse or marsh land or the banks of foul streams. Whenever there is a general hospital in the town, conveniently accessible, arrangements should, if possible, be made with the authorities for the reception of necessitous cases.

In the present state of uncertainty as to the mode of propagation of cholera, it is recommended that in hospitals and other places where cholera patients are under treatment, all foul linen, as soon as it is removed from the patients or from their beds, should be immersed in boiling water, or in water to which a disinfecting fluid has been added.

The vessels used for the reception of the discharges from cholera patients should be removed and cleansed without delay; and great personal cleanliness on the part of all nurses and attendants should be strictly enjoined.

The patients should generally be removed to the hospital in the horizontal posture. Each union house should therefore be provided with one or more litters, or other appropriate conveyance, for this purpose. And as the removal of patients in the extreme stages of the disease is attended with danger, this should always be done under medical advice.

Houses of Refuge.

Experience has abundantly proved that when cholera has broken out in a foul and noisome locality, or in an overcrowded, ill-ventilated, and dirty house, the best means of preventing the spread of the disease, and the consequent loss of life, is to remove the inhabitants until the necessary cleansing and other remedial measures have been executed. For this purpose some temporary places of accommodation should be provided for the people.

These places may be either hired houses, or other spacious buildings, warehouses properly fitted up, or temporary erections, as large sheds, made for the purpose. Sometimes tents, or school-rooms, unoccupied chapels, &c., have been used with advantage, and sometimes vacant rooms in the workhouse. In all cases the advantage of removing persons at once from the immediate influence of the causes of infection has been so conspicuous as to render the provision of houses of refuge one of the most important means of counteracting the spread of cholera. Great care should also be taken to select only such sites for houses of refuge as are dry, elevated, capable of free ventilation, and, if possible, isolated from other habitations. These places should always be in readiness in case a sudden outbreak of the disease should occur.

Dispensaries.

In every affected district dispensaries and depôts for medicine should be established, where, at any hour of the day and night, the poor may be able to obtain, gratuitously, medical advice and a supply of appropriate medicines.

The dispensaries should be the surgeries of the Poor Law medical officers, and, if deemed necessary, special depôts should be temporarily appointed.

In many instances the chemists' shops will be found to be the most convenient places.

In rural districts, depôts of ready prepared medicines should be established at the houses of one or more of the most intelligent and influential residents.

Notices and Placards.

These will be required for the purpose of thoroughly informing the people what they should do, and what has been provided for them. A form of notice embodying the various points to which the attention of the people should be strongly drawn is appended. (See Appendix 1.)

Returns.

In order to enable the local authorities to ascertain the state and progress of the epidemic from day to day, it is particularly desirable that returns of the cases discovered and treated, as well as of the deaths, should be daily made. These returns will also be of great national importance, as tending to improve our acquaintance with the disease, and to suggest the most efficacious means of dealing with it on a large scale. The proposed returns will come under three heads—"Visitor's Returns," "District Medical Officer's Returns," and "Returns by Medical Superintendent."

Forms for each of these returns are given in Appendix 2, together with short instructions for filling them up.

The main objects of these returns are to ascertain the exact daily progress of the epidemic among the poorer classes in every district; to determine clearly the proportion which exists between cases of diarrhœa and cholera; and the precise effect of treatment.

The returns of deaths throughout the union from cholera or diarrhœa ought if required to be furnished daily to the medical superintendent by the local registrars. The returns should be made up invariably from midnight to midnight.

Special Duties of the Medical Superintendent.

He should, immediately on entering on his duties, call a meeting of the *district medical officers*, which all the resident medical practitioners should also be invited to attend; and he should then briefly state the measures which he has to propose, and describe the duties which he and they have severally to perform.

He should then place in the hands of the medical officers, and the other resident medical practitioners, the forms of medical returns, and invite their attention to the president's letter, embodying the recommendations of the Medical Council.

He should make such arrangements as are necessary to ensure concerted action; and to enable him to trace the progress of the epidemic, request all the medical men, as well as the district medical officers, to enter the number of *new cases* that they see day by day in the short returns, which should be collected at a stated hour daily.

He may request them to enter in the same forms on every Saturday the number of cases belonging to the several heads, then under their care.

He should organize, regulate, and take the entire conduct of the visitation system immediately after the preliminary meeting already described. As the first step in the fulfilment of this duty, he should communicate to the clerk of the Board of Guardians the probable number of qualified medical assistants and of medical students that will be necessary to form the visiting staff

and should take the necessary means to engage this number, and to ensure their being in readiness to obey his summons the moment he issues it.* He should also inform the clerk of the guardians of the nature and extent of the accommodation needed for the temporary hospitals and houses of refuge; the districts which will be placed under inspection; and the dispensaries or depôts of medicine which it may be proposed to open.

His next step should be to divide the locality under his charge into districts and sub-districts for visitation purposes. As the daily visitation will be carried on chiefly in the localities which are the usual haunts of epidemic disease, and the dwelling-places of the poorer classes, care should be taken that the limits of each sub-district should be considered with reference to this basis of action. As a general rule each sub-district should embrace only so many houses as one visitor can manage effectively to visit every day.†

The next care of the medical superintendent should be to provide houses of refuge and dispensaries, and, if necessary, temporary hospitals, and to place them respectively in the best state practicable, as regards their sanitary arrangements and general efficiency.

In places where there are factories he should write to the Secretary of State for the Home Department, requesting him to authorize the factory inspectors to direct their certifying surgeons to visit such factories daily, for the purpose of inquiring as to the existence of diarrhœa amongst the workpeople, and promptly administering the proper medicines.

He should also address a circular to the proprietors or managers of every establishment where large numbers of work-people or children may be daily congregated together, inviting them to co-operate with the medical officer, and suggesting the means by which such co-operation may be made most effectual. A form for the proposed circular is annexed. (Appendix 3.)

After settling with his colleagues the remedies which in cases of emergency may be administered before the arrival of a qualified practitioner, the medical superintendent should take care that directions for the use of each form of medicine be printed in plain type, and that instructions be given to all persons charged with the distribution of the medicines, whether at the dispensaries or elsewhere, to attach the appropriate directions in the form of a label to such medicines.

The directions should never omit to state briefly the dose for adults, for young persons, and for children.

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* If the clerk has not previously received from the guardians the requisite authority to make such arrangements as the medical officer may think necessary, he should at once apply for such authority, and lose no time in acting upon it when obtained.

† The number of such houses will of course vary with circumstances; but in thickly-peopled localities, where the several stories and apartments of each house are generally inhabited as distinct tenements by different families, it has been found that one visitor may visit every day 200 separate families.

The medical superintendent will receive the reports of the inspector of nuisances, and should urge the strict observance, as far as possible, of the regulations issued by the General Board, under the Nuisances Removal and Diseases Prevention Act, more especially as to the removal of nuisances, the cleansing and whitewashing of filthy tenements, the ventilation of unwholesome rooms, the prevention of over-crowding, and the enforcement of the Common Lodging-houses Act.

He should every day send to the General Board the return (duly filled up) of which a form is given (Appendix 2, E.), accompanied by such remarks as he may deem calculated to display any interesting points connected with the progress of the disease. Any important information which he may obtain relative to outbreaks in neighbouring localities, though not in his district, should be promptly forwarded by him to the General Board. It is of the utmost importance that these returns be made regularly day by day.

He should every day, or as often as necessary, meet the medical officers, assistants, and visitors, at an appointed hour ; receive their several reports, and settle (with their advice) any practical questions of administrative detail which may have been raised by the proceedings of the day ; and also confer with them as to the expediency of increasing, diminishing, or re-distributing the staff of medical assistants and visitors.

When the epidemic is over, he should prepare for transmission to the General Board a succinct report on the whole history and progress of the epidemic, from its first commencement to its termination, with statistical tables and a map, marking the infected localities. The points to which the report should be chiefly devoted are suggested in the list of queries set forth in Appendix 4, and in the statistical tables.

In drawing up his report the medical superintendent should avail himself of the reports and returns of the medical officers and inspectors of nuisances.

Duties of Medical Officer.

The first duty of the medical officer is to give instant attention to the treatment of the sick. He should therefore immediately visit all cases of cholera reported to him by the visitors, or which may otherwise come to his knowledge as being destitute of medical aid. He should also give prompt attention to every case of diarrhœa which the visitors may report as requiring his assistance.

He should further execute, with all practicable efficiency, the various duties assigned to the district medical officers in the directions and regulations issued by the General Board, under the Nuisances Removal and Diseases Prevention Act, especially those which relate to overcrowded dwellings and the removal of nuisances.

He should supervise such cleansing operations as might be attended with risk if negligently performed.

His surgery should be open all day as a dispensary (see below as to duties of persons in charge of dispensaries). If his house should be one of those deemed convenient for the purpose, he should have his surgery open as a dispensary all night, for the use of one of the legally qualified medical men who might be appointed to assist him.

He should see that a supply of blankets, and other articles required by the sick, is kept at a convenient place in each district; but no such articles are to be given out except upon his written order or that of the medical superintendent, countersigned by some person authorized in that behalf by the Board of Guardians.

He should endeavour to organize a staff of nurses for the care of such poor and destitute persons as most urgently require constant attendance.*

He should, in proper cases, furnish persons with tickets of admission into houses of refuge, and no persons should be admitted into such houses without a ticket signed by him or one of his qualified assistants.

He should give such directions as may appear to him to be needful, with respect to the care, removal, and the time of interment of the bodies of persons dying of cholera.

He should, unless where other arrangements have been made, furnish the house-to-house visitors with a supply of medicines for distribution on the spot to all persons suffering from diarrhœa, and with a sufficient number of printed labels of directions adapted to each kind of medicine. He should meet daily the medical superintendent and the medical assistants, punctually at the hour appointed for the meeting. He should daily have in readiness by that hour the return for the previous day. He should, to the best of his ability, record the cases treated by him in Forms A. and B., Appendix 2, and furnish full replies, when required to do so, to the queries contained in Appendix 4. He should also be in daily communication with the house-to-house visitors of his district, and examine their returns.

Duties of House-to-House Visitors.

The house-to-house visitor will be directed in his operations, in all respects, by the medical superintendent.

He will take notes of the cases discovered by him according to the schedule entitled "Visitor's Return" (Appendix 2, C.), will make a daily return to the medical superintendent.

He will visit every house in the sub-district assigned to him, once each day, *at the least*, commencing his visitation at as early an hour in the morning as circumstances will permit. In cases of sudden outbreaks of the epidemic in confined localities, it may be necessary that the visitation should be made more frequently.

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* The provision of blankets, &c., and of a staff of nurses, will, of course, be made after communication with the clerk of the Board of Guardians and the medical superintendent.

He will hold himself in readiness to take charge immediately of any new district that may be assigned to him by the medical superintendent, whether within or without the district in which he may have previously served.

He will use his best endeavours to discover the existence of cholera and diarrhœa in the district assigned to him. He should by his manner and behaviour endeavour to gain the confidence of the people among whom he visits. He should be provided with medicines to dispense to all persons found to be suffering from diarrhœa, or from other symptoms approaching cholera.

Whenever he finds a case of diarrhœa which resists simple treatment, or which is attended with any other symptoms of approaching cholera, he will immediately report it as a case of urgency to the medical officer.

Whenever he finds a case of cholera or collapse, he will instantly despatch a messenger to the medical officer informing him of the fact.

He will not interfere in the subsequent management of such cases, except under the direction of the medical officer, and he will be most careful not to interfere with cases already under medical treatment, unless in *emergency*.

He should in a kind manner converse with the people, and endeavour to allay alarm; he will give advice as to the importance of cleanliness of person and dwelling; of ventilation, more especially of sleeping-rooms; of temperance, and proper diet.

He should strongly impress on the people the great danger of neglecting looseness of the bowels, *or diarrhœa*, and the necessity of immediate application, on the first appearance of these symptoms to the dispensaries or depôts; and in urgent cases, to the medical officer in charge of the district, at any hour of the day or night.

He should caution the people not to move about while diarrhœa is upon them, but to remain quiet, and, if possible, in bed.

He will state in his return to the medical superintendent, or to the parties in charge of the disinfectants, blankets, &c., the names of such necessitous persons as he may think should be supplied with such articles.

He will warn persons living in unwholesome dwellings, and in infected districts, of the urgency of cleansing operations, and of temporary removal from such localities, and he will endeavour to induce parties to act upon his advice.

He will report to the superintendent, or to the proper authority, all nuisances which he may discover during his visits; and any houses, rooms, or localities which may stand in urgent need of cleansing and purification.

He will meet the superintendent every day at the time appointed.

Duties of Persons in charge of Dispensaries and Depôts for Medicines.

The medical officer will, of course, superintend the arrangements for the dispensing of medicines at his own surgery.

The persons charged with the management of temporary depôts should always, when practicable, be qualified medical practitioners. They will be subject to the direction of the medical superintendent.

At each of the dispensaries, both those which are opened by day, and those which are opened by night, some *qualified* assistant should be always on the spot ready to give medical advice and medicines to all applicants.

The medicines prescribed for administration as remedies should be kept ready made up, and, as has been already pointed out, should never be given to an applicant without an appropriate printed label of directions.

Dispensers must accurately fill up returns and transmit them to the medical superintendent. These returns must also be filled up by the person in charge of the dispensary, even when he happens to be the medical officer.

In the foregoing minute the Board have not insisted in detail on the importance of the most rigid enforcement of the directions issued by the Board under the Nuisances Removal and Diseases Prevention Act, partly because they presume that Boards of Guardians are already fully alive to the duties imposed on them by Parliament in relation to those directions, and partly because they are unwilling to complicate with any collateral details the exposition of the process by which the system of house-to-house visitation may be most effectually worked.

APPENDIX 1.

(TO INSTRUCTIONS TO LOCAL AUTHORITIES, &c.)

Form of Notice to Inhabitants of Arrangements adopted to meet Epidemic Cholera.

NOTICE.

The Board of Guardians hereby inform the inhabitants that the following arrangements have been made by the authorities for the relief of the poor, and for the preservation of the public health during the persistence of Epidemic Cholera :—

MEDICAL ADVICE AND ASSISTANCE.

The town has been divided into districts, which are the same as the parochial medical officers' districts. Applications for medical advice,

attendance, and medicines (which may be had *without charge*) for cases of cholera may be made in—

District No. 1,	*District*—to Dr.
„ „ *or*	„ Dr.
District No. 2,	*District*—to Dr.
„ „ *or*	„ Dr.
District No. 3,	*District*—to Dr.
„ „ *or*	„ Dr.

All of whom are empowered and required to afford assistance with the least delay possible.

Dispensaries and Depôts for the Supply of Medicines.

It has been found that cholera is preceded by looseness of the bowels for some time, sometimes days, sometimes only hours, before the severer symptoms of cholera set in; such as sickness, vomiting, cramps, or severe purging. This diarrhœa is easily curable, but if it be neglected it may rapidly run on into cholera, when its course can scarcely be controlled, and death too often ensues.

Persons suffering from looseness of the bowels should apply, even although there be no pain of the bowels, at any of the following places, where medicines, with printed instructions, may be obtained. Persons affected in the night are urgently warned not to wait till morning, but to apply at once for medicines (or attendance, as above directed, if necessary) at

The During the Night,

where the medical officers will be in attendance.

In addition to the above, medicines will be supplied *gratuitously* During the Day by—

House-to-House Visitors.

Qualified persons will be appointed by the authorities to visit the infected localities, and to distribute medicines to those among the people who are affected with cholera, or looseness of the bowels.

Persons affected with looseness of the bowels are not, however, if they become worse during the period intervening between the visits of the house-to-house visitor, to wait till his return, but to apply to the local dispensary or depôt at once.

Nurses.

The district medical officers and assistant officers are empowered to employ certain nurses for the care of those *poor and destitute persons* who more urgently require such aid. Persons willing to become nurses will send in their names to the undersigned.

Hospital Accommodation.

Cases of cholera occurring among the poor and destitute will be received into the on the order of the medical officers of the and of the above district medical officers; but the public is earnestly cautioned against sending cases of *complete collapse* to the , without medical authority, because the patient may die in consequence of the removal.

House of Reception.

A house of reception has been provided at for the reception of the families of those persons suffering under cholera whose houses are in such a state as to endanger the lives of the occupants, or where temporary cleansing works are necessary for safety. All persons are urgently warned that the only effectual measure of safety for those who inhabit unwholesome dwellings and infected districts is removal from the locality.

Houses Unwholesome and Unfit for Human Habitation.

Inspections are being made, and the owners of all such houses or parts of houses will be proceeded against where the law admits. To avoid proceedings, owners of such houses should at once endeavour to place them in a wholesome condition.

Lodging Houses.

All persons keeping lodging houses are required to register the same forthwith, in accordance with the law. Persons keeping lodgers without being registered and properly licensed, incur a penalty of £5.

Inspection of Nuisances.

Inspections of nuisances are being carried on. All complaints should be delivered in writing at the , addressed to Mr. when the most prompt attention will be paid, and the necessary steps taken for their removal, where practicable.

By order of the Board,

, Clerk of the Board of Guardians, or
Inspector of Poor.

Precautions against Cholera.

1. Apply for medicine immediately to stop looseness of the bowels, or it may bring on cholera.
2. Do not take any strong opening medicine without medical advice.
3. Beware of drink, for excess in beer, wine, or spirits is likely to be followed by cholera.
4. Drink no water which has not been boiled; and avoid that which is not quite clear and well tasted.
5. Avoid eating meat that is tainted, decayed or unripe fruit, and stale fish or raw vegetables. Cooked vegetables, or ripe and cooked fruit, in moderation, are a necessary part of diet at all times.
6. Avoid fasting too long; be moderate at meals.
7. Avoid great fatigue, and getting heated and then chilled.
8. Avoid getting wet, or remaining in wet clothes.
9. Keep yourself clean, and your body and feet as dry and as warm as your means and occupation will permit.
10. Keep your rooms well cleaned and lime-washed; remove all dirt and impurities immediately.
11. Keep your windows open as much as possible to admit fresh air; and, if necessary, use chloride of lime or zinc to remove any offensive smells.
12. If there are any dust or dirt heaps, foul drains, bad smells, or other nuisances in the house or neighbourhood, make complaint without delay to the local authorities having legal power to remove them, or if there be no such authorities, or if you do not know who they are, complain to the Board of Guardians.

APPENDIX 2.

(TO INSTRUCTIONS TO LOCAL AUTHORITIES, &c.)

Medical Forms of Return.

THIS Letter was sent with the two following Forms (A. & B.) to the Medical Practitioners of the Metropolis.

General Board of Health, Whitehall,
September 1854.

SIR,—My experience of this department, brief as it is, has strongly impressed me with a sense of the great want that is now felt of some systematic record of cases of Choleraic disease, their treatment and results, with a view to determine, in so far as may be possible, the best mode of meeting this formidable Epidemic.

Hitherto no successful attempt has been made to collect such a record; and as I find that my feeling of the want of it is very generally shared by the medical profession, I have obtained the sanction of Her Majesty's Government to the nomination of a Medical Council, representing all branches of the profession, and consisting of Dr. Paris, Sir James Clark, Dr. Alderson, Dr. Babington, Dr. Tweedie, Dr. Baly, Mr. Lawrence, Mr. Simon, Professor Owen, Mr. N. B. Ward, Mr. John Bacot, and Dr. Farr.

Under the sanction of this Council, the following form of return has been prepared for transmission to all qualified practitioners in the metropolis, to be filled up by them, with a view to obtain their experience of the present Epidemic.

The deaths from Cholera, as well as from all other causes, are registered in England; but it is evidently desirable that in this as in other countries the cases of recovery, as well as of death, should be systematically observed and recorded. But this can only be accomplished by the cordial co-operation of all the medical men in practice, which the Board hopes, in this important matter, to obtain, by acting on the advice of a Council in which all branches of the medical profession are represented.

By means of a return, in the accompanying forms, the observations of all qualified practitioners on the cases that come under their care may be collected, and made available for determining the laws which regulate Choleraic disease, and the effects of the different systems of treatment now in use.

Any return that you may make will be considered strictly confidential, but your name will be recorded as a contributor to the observations, when the general results are made known.

Under the urgent pressure of practice, to keep any accurate record of the cases will often be attended with difficulty; but this difficulty will, I feel assured, be cheerfully encountered by you, if you agree with me in thinking a record of the experience of the present generation of medical men as to this epidemic likely to contribute to the alleviation of the sufferings of mankind for the future.

The return on the other side is sent filled up, as a specimen, with blank forms. Any number of such forms you may require will be furnished by this office.

It is recommended that the forms should be filled up from day to day, and returned to the Board, on or before the 15th November next, addressed to the Secretary of the General Board of Health, and the postage of the letter enclosing the return need not be prepaid.

I have the honour to remain, Sir,
Your obedient servant,
B. HALL.

Returns of Choleraic Disease.

Form A. Diarrhœa.

Sheet of Instructions and Examples for the Record of Cases of Diarrhœa.

(Attention is particularly requested to the following instructions, as the value of the returns will depend on their uniformity.)

Instruction I.—The following *degrees or stages of the disease* should, when possible, be distinguished.

Diarrhœa.
1. *Simple.*—Alvine discharges liquid, but fœcal. Vomiting and cramps absent.
2. *Choleraic.*—Alvine discharges very copious, watery, still tinged with bile. Vomiting generally present, but not continued or urgent. Cramps absent.

All cases of "Diarrhœa" are to be entered on the sheet A. as soon as they are seen.

So soon as the "Choleraic Diarrhœa" passes into "Cholera," the fact should be recorded in the proper column of this Return (A.), and the pen should be drawn through the case, all the particulars of which should then be transferred to the "Return B.," and its subsequent course be there recorded.

Instruction II. *Absence of Stages.*—The commencement of "Choleraic Diarrhœa" is generally marked by vomiting; and when vomiting exists from the very beginning, the word "*absent*" or "*abs.*" may be written opposite "Simple Diarrhœa" in the Return.

Instruction III. *Dates.*—When the time of commencement of either stage cannot be ascertained, the words "*not known*" or "*n. k.*" should be written in the place of date; but the time of commencement may generally be stated approximately. (See Instruction III. Return B.)

Instruction IV. *Treatment.*—The nature of the treatment should be indicated in the Return as concisely as possible. When any uniform and definite plan of treatment is adopted in a series of cases, that plan should be accurately described in the space for "Remarks," and should be indicated in the Table by one or two words, as "*Conf. Arom. c. Op.*," "*Sulph. Ac.*," &c.

General Return of the Number of Cases

	Total Number of Cases.	Cases of Simple Diarrhœa not passing into further Stages.
	204	181

All Cases of Diarrhœa, with Particulars

No. of Case.	Residence when attacked (Street and Number of House).	Sex. M.	Sex. F.	Age last Birth-day.	Rank and Occupation. (If Master, write Mast. after the Name of Occupation.)	Degrees or Stages of the Disease.
	1, George Street, Rotherhithe.		F.	13	Daughter of Bargeman.	Simple Diarrhœa -
						Choleraic Diarrh. -
2	44, Thomas Street, Lambeth.	M.		2	Son of Labourer.	S. Diarrh. - -
						Ch. Diarrh. - -
3	12, William Street, Golden Square.	M.		45	Baker (Mast.)	S. Diarrh. - -
						Ch. Diarrh. - -
						S. Diarrh. - -
						Ch. Diarrh. - -
						S. Diarrh. - -
						Ch. Diarrh. - -
						S. Diarrh. - -
						Ch. Diarrh. - -
						S. Diarrh. - -
						Ch. Diarrh. - -

Remarks.

Note.—Blank Forms A. & B., which may be procured from the General the private practitioners of places in which diarrhœa and cholera are

OF DIARRHŒA NOT PASSING INTO CHOLERA.

Cases of Choleraic Diarrhœa not passing into further Stages.	
23	

of their Duration and Treatment.

Dates of their Commencement.		Date of Termination,			Treatment.		
					When commenced.		Its Nature. (For the mode of filling up this Column see Instruction IV.)
Day.	Hour.	in Recovery.	in Death.	in Cholera.	Day.	Hour.	
Aug. 1.	Noon.	Recov. Aug. 3.			Aug. 2.	10 a.m.	
—	—						
Aug. 3.	9 a.m.						
„ 8.	6 a.m.		Death Aug. 10, 7 p.m.		Aug. 8.	11 a.m.	
Aug. 9.	1 a.m.				Aug. 9.	noon.	
„ 10.	6 a.m.			Cholera. Aug. 10, 7 p.m. See No. 2 in Return B.	Aug. 10.	10 a.m.	

REMARKS.

Board of Health, should be placed in the hands of the medical officers and of epidemic.

Returns of Cholera Disease. Form B. Cholera.

Sheet of Instructions and Examples for the Record of Cases of Cholera.

(Attention is particularly requested to the following instructions, as the value of the Returns will depend on their uniformity.)

Instruction I.—*The following Degrees or Stages of the Disease* are generally recognized by the Medical Profession, and wherever it is possible should be distinguished. The terms adopted to designate them are in common use. All the stages are not present in every case.

Diarrhœa.

1. *Simple.* — Alvine discharges frequent and liquid, but fœcal. Vomiting and cramps absent.
2. *Choleraic.* — Alvine discharges very copious, watery, still tinged with bile. Vomiting generally present, but not continued or urgent. Cramps of extremities absent.

Cholera.

3. *Without Collapse.*—Alvine discharges watery, colourless, with white flakes (rice-water). Vomiting commonly urgent. Cramps of extremities frequent and severe. Eyes somewhat sunken. Temperature of surface lowered. Pulse small and feeble. Urine not secreted.
4. *With Collapse.* — Surface of face and extremities quite cold, often wet. Face and hands much shrunken, and more or less deeply livid. Cramps present. Pulse at wrist absent or scarcely to be felt. Veins of extremities contracted to dark threads. Urine not secreted. Voice usually much altered and feeble.
5. *Consecutive Fever.*—Temperature of surface more or less restored. Pulse distinct, sometimes full and throbbing. Veins more or less filled. Face less shrunken, or even full and deeply flushed. Drowsiness passing into stupor. Alvine discharges again containing bile. Urine, in most cases, still suppressed.

Instruction II. *Absence of Stages.*—The absence of any one or more of the earlier stages should be indicated by the word "*absent*" or "*abs.*" written opposite the deficient stage in the place of the date of commencement. The fact of the disease not reaching the later stages will be sufficiently shown by the mode of termination of the case, ("*death,*" or "*recovery,*") being written opposite the stage at which the disease ceased.

INSTRUCTION III. *Dates.*—When the time of commencement of a particular stage cannot be ascertained, the words "*not known*" or "*n. k.*" should be written in the place of the date. But although the precise hour of the commencement of each stage cannot be determined exactly, except in rare instances, it may generally be stated approximately by taking some intermediate time between a known period when the symptoms of the particular stage were entirely absent, and one in which they were clearly developed.

INSTRUCTION IV. *Recovery.*—The date of recovery should be fixed at the time when all the symptoms of the disease, and all marked disturbances of health directly resulting from it, have disappeared, although some degree of debility may remain.

INSTRUCTION V. *Treatment.*—The nature of the treatment should be indicated in the Table as concisely as possible. When any uniform and definite plan of treatment is adopted in a series of cases, that plan should be accurately described in the space for "REMARKS," and should be indicated on the Table by one or two words, as "*Salines*," "*Calomel c. Op.*," "*Stimulants*," "*Sulph. &c.*," &c.

INSTRUCTION VI.—If any patient at the time of the attack was already suffering from another disease, the nature of that disease and the treatment used for it should be mentioned in the "REMARKS."

FORM B. - - - - - -

GENERAL RETURN OF NUMBER

Total Number of Cases.	Cases of Cholera not passing into complete Collapse.
23	15

All CASES OF CHOLERA, with Particulars of the Duration

No. of Case.	Residence when attacked (Street and Number of House.)	Sex. M.	Sex. F.	Age (last Birth-day.)	Rank and Occupation. (If Master, write Mast. after the Name of Occupation.)	Degree or Stages of the Disease.*
1.	7, John Street, Bedford Square.		F.	30	Lodging House Keeper.	Simple Diarrhœa -
						Choleraic Diarrh.
						Cholera (without collapse) - -
						Collapse - -
						Consecutive Fever -
2.	12, William Street, Golden Square.	M.		45	Baker. (Mast.)	S. Diarrh. - -
						Ch. Diarrh. - -
						Cholera - - -
						Coll. - - -
						Consec. F. - -
3.	20, Frederick Street, Hoxton.	M.		15	Son of Bricklayer.	S. Diarrh. - -
						Ch. Diarrh. - -
						Cholera - -
						Coll. - - -
						Consec. F. - -
4.	13, Mary Street, Poplar.		F.	63	Wife of Master Shoemaker.	S. Diarrh. - -
						Ch. Diarrh. - -
						Cholera - -
						Coll. - -
						Consec. F. - -

REMARKS.

NOTE.—Blank Forms A. and B., which may be procured from the General the private practitioners of the places in which diarrhœa and cholera are

- - - - - - FORM B.

OF CASES OF CHOLERA OBSERVED.

Cases of complete Collapse.	Number of foregoing Cases in which Consecutive Fever supervened.
18	8

and Treatment of the several Stages in each Case.

Dates of their commencement.		Termination of the Case.		Dates of Death or Recovery.		Treatment in the several Stages. (For the mode of filling up this Column, see Instruction No. V.)
Day.	Hour.	Death.	Recovery.	Day.	Hour.	
Aug. 18						
„ 5	1 p.m.					
„ 5	8 p.m.					
„ 5	12 p.m.	Death.		Aug. 6.	2 p.m.	
Aug. 9	1 a.m.					
„ 10	6 a.m.					
„ 10	7 p.m.					
„ 10	11 p.m.					
„ 12	8 a.m.		Recovery.	Aug. 14		
Not	known.					
Aug. 17	11 p.m.					
„ 18	7 a.m.					
„ 18	6 p.m.		Recovery.	Aug. 20		
Absent.						
Aug. 18	Noon.					
„ 18	4 p.m.					
„	11 p.m.					
„ 20	4 p.m.	Death.		Aug. 25		

REMARKS.

Board of Health, should be placed in the hands of the medical officers, and of epidemic.

FORM C.

HOUSE-TO-HOUSE VISITOR'S DAILY RETURN, with Examples as to mode of filling up the same.

Date _____ *Day of* _____ 1854.

Streets or Places within Visitor's District - - } Within which the above Streets or Places are situated.

Registration District,

Do. Sub-District,

Street visited.		Numbers of Persons in Houses visited.	Names of Persons visited.	Sex and Age.		Occupation (distinguishing Masters).	Nature of Illness.	No. of Visit.	Advice and Prescription.
No. of	Name of Street.			M.	F.				
1	Silver Street -	9	John Jones - -	31	—	Bricklayer (Master) -	S. Diarrhœa - -	First -	Mixture No. 1.
			Jane Jones - - -	—	28	Bricklayers' Wife - -	Cholera - -	First -	See Medical Officer.
			Anne Evans - -	—	18	Bricklayers' Daughter -	Collapse - - -	First -	Do.
			Jane Evans - - -	—	15	Do. Do. -	Cholera.—Dead - -	First -	Refer to Med. Off.
2 to	Do. -	—	No Persons ill.						
9	Do. -	7	Thomas Roberts - -	56	—	Tailor - - -	Choleraic Diarrhœa -	Second	See Medical Officer.
			Jane Roberts - -	—	12	Tailor's Daughter - -	S. Diarrhœa - -	First -	Powder No. 1.

Summary of Visitor's Return.

1. Number of Houses visited by him during the Day - - - -
2. Number of Houses in which Cases of Diarrhœa or Cholera were found - -
3. Number of Persons resident in Houses of No. 2. - - - -
4. Cases visited; viz. - - - - - - -

	Cases visited.			How treated.		
	First Time.	Second, &c. Time.	Total.	Prescribed for.	Referred to Medical Officer.	Referred to Dispensary or Hospital.
S. Diarrhœa - - - -	27	16	43	42	1	—
Choleraic Diarrhœa - - - -	13	9	22	10	22	—
Cholera without collapse - - -	8	4	12	—	12	—
Cholera,—Collapse - - - -	4	1	5	—	5	—
Cholera,—Consecutive Fever - -	1	1	2	—	2	—
Total -	53	31	84	52	42	—

I hereby certify that I commenced my Visits at o'clock A.M., and completed them at o'clock P.M., and that the above is a correct return.

Examined,

_____ Signature of Visitor.

_____ Medical Officer.

_____ Date.

Form D.

Medical Officer's Short Daily Return of Numbers.

(To be made by all Medical Officers of Districts and by Officers of Dispensaries or Hospitals.)

Registration District or Union. .....

Number of Cases seen by me to-day for the First Time.

—	Suffering, when first seen, from					Total Cases of Diarrhœa and Cholera.
	Diarrhœa.		Cholera.			
	Simple.	Choleraic.	Primary Stage.	Collapse.	Consecutive Fever.	
Total cases seen for First Time -	20	7	3	2	1	35
Of the above numbers the following have not been previously seen by the House-to-House Visitors or the Dispensary Officers* - - -	10	2	1	1	—	14

* Marks should be made against each case of this kind in the Forms A. and B. for the record of cases.

I hereby certify that the above is a correct return.

John Jones.

_____ *Address.*

_____ *Date.*

Form E.

Medical Superintendent's Daily Summary of New Cases of Cholera and Diarrhœa.

—	Diarrhœa.		Cholera.			Total New Cases.
	Simple.	Choleraic.	Without Collapse.	Collapse.	Consecutive Fever.	
Cases first seen this day by House-to-House Visitors:						
By Mr. *John Jones* - -	20	5	3	2	—	30
„ *Edward Evans* - -	47	31	9	7	1	95
Cases first seen by Medical Officer to-day, EXCLUSIVE of those seen and previously returned by House-to-House Visitor:						
By Mr. *Thomas Wilkins* -	26	13	2	—	—	41
„ *Evan Roberts* - -	15	7	3	1	1	27
New cases first seen by private medical practitioners to-day:						
By Mr. *William Davis* - -	13	6	4	1	—	24
„ *Thomas Williams* -	7	5	3	1	—	16
Total New Cases - -	128	67	24	12	2	233

The above return has been accurately transcribed from the returns.

Medical Superintendent.

_____ day of _____ 1854.

Note.—The Medical Superintendent will incorporate the last line in his daily return to the General Board of Health; and he will carefully preserve the returns of the medical practitioners and of the house-to-house visitors from which the transcript has been made.

He will collect the returns A. and B. from the medical practitioners and from the dispensaries and hospitals at the close of the epidemic, and forward them to the General Board of Health.

FORM F. - - -

No of House.	Name of Place.	General condition of House.			Yards and Cellars.			Water Supply.				Privies, and		
		Clean?	In good Repair?	With any Accumulation of Refuse or Rubbish?	Dry?	Clean?	Paved?	Is there separate Water Service to the Premises, and from what Company?	Receptacles.			Is there separate Privy to the House? and where?	Cesspool?	Offensive or obstructed Condition of Drains?
									What?	Where?	Condition?			

NOTE.—Every house in the infected parts should be visited by the Inspector of Nuisances or

FORM F.

Sinks, Drains.		Complaints of Public Nuisance.				Ventilation.			Lodgment of Inmates.				REMARKS.
						Windows.							
Is the Privy properly supplied with Water?	Untrapped Sinks or Drains?	Gully or Air Grating?	Offensive Trade?	Defective Scavenage?	Other Matters?	Front?	Back?	Back Door?	Number of inhabited Rooms?	Number of separate Holdings?	In which Room or Holding was recent Death or Illness?	No. of present Inmates of such Room or Holding?	

other officers, and the results should be submitted to the Medical Officer for his examination.

APPENDIX 3.

(TO INSTRUCTIONS TO LOCAL AUTHORITIES, &c.)

Form of Notice to Owners and Managers of Public or Private Works and Establishments.

Sir,

I am directed by the Guardians of the Poor of to call your attention to the accompanying notice, which they have deemed it their duty to issue to owners, managers, and overseers of public works and establishments, and others who employ or have under their care large numbers of persons.

I am, &c.

Clerk to the Board of Guardians.

NOTICE.

Experience has fully shown that during the prevalence of epidemic cholera, owners, managers, and overseers of works and establishments have it in their power, by proper precautions, to effect a great saving of life among their work-people.

It is of great importance to bear in mind that the workers in large establishments usually leave home before the time at which the house-to-house visitation can be systematically commenced, and are therefore deprived of the benefits of this most important measure of prevention.

In all places where numbers of people daily assemble at work, the first care of persons in charge of the work-people should be to make an arrangement by which an inquiry may be daily made as to the existence of looseness of the bowels among any individuals in the establishment. For this purpose, one trustworthy person in each story or room should be selected, who should be duly instructed in this duty.

This inquiry ought to extend over the whole period of the epidemic influence, and should be made in the morning, when the work-people first assemble.

The great importance of paying attention to the very first signs of choleraic disease ought to be impressed upon the people, also the advisability of promptly seeking medical aid; and this caution should be impressed as applying alike to their being attacked in the establishment warehouse, or factory, as at their own homes.

The majority of cases of cholera which prove fatal, terminate in twenty-four hours; the period for the application of preventive treatment is therefore so short, that the loss of an hour may be the loss of life.

The arrangements for the prevention and mitigation of the disease ought to be made thoroughly known, and for that purpose the hand-bills and placards of the authorities should be posted up in some conspicuous place in each story or room in the establishments and factories.

At all the establishments a supply of the medicines, with the printed instructions, adopted by the parochial medical officers, should be kept, and be readily accessible to the members of the establishments, and to the work-people.

Where establishments are superintended by their own medical officers, upon such officers should be devolved the duties of seeing that the instructions are carried out, and that proper medicines are supplied to the

work-people ; but in no cases should the duty of daily inquiry, and the providing of remedies on the spot be neglected. Where no medical officers are in charge of such establishments, special medical officers should be appointed.

A record of the persons that apply for medicine, should be kept, in order that the attention of the medical officer may be promptly called to all such cases.

The same instructions as the above apply with peculiar force to all assemblies of children at schools, and, in fact, to all persons who have the care, management, or superintendence of numbers of persons.

The principle holds equally true with regard to all domestic establishments. Thus the heads of families should make similar inquiries.

APPENDIX 4.

(TO INSTRUCTIONS TO LOCAL AUTHORITIES, &c.)

GENERAL BOARD OF HEALTH.

QUERIES.

Addressed to Dr. or Mr. _____, Medical Officer in the Town, Parish, City, or Union of _____ .

1. How long have you been employed as medical officer?
2. In what district have you been employed?
3. What has been the total number of cases treated by you of
   Diarrhœa?
   Cholera?
   Collapse?
   And how many died?
4. Will you specify any particular sanitary evils in your district which have been brought to light during the epidemic?
5. In the course of your service have you discovered any place the sanitary arrangements of which were tolerably perfect, yet where, nevertheless, cholera prevailed? Were the cases occurring in such localities exceptional cases or imported?
6. Has there been any, and what is the amount of, improvement in the sanitary condition of your district, effected since the outbreak of the epidemic? Has such improvement partaken of a temporary or permanent character?
7. Have the nuisances which you reported been abated, and to what extent?

8. Have cleansing works been instituted in the houses of the poorer classes where cholera cases or deaths have occurred ?

9. Will you state the local and removable causes in the district visited by you which you believe have contributed to the localization and spread of the disease ?

10. Has overcrowding prevailed, and to what extent ?

11. Have you observed any peculiarities in this epidemic ?

12. To what extent did the district suffer from previous epidemics ?

13. Did former epidemics of cholera prevail in the same or in different spots ?

14. Enumerate the spots most severely visited by cholera on former occasions, and those most severely visited in the present epidemic, and state whether in the interval between the epidemic of 1849 and that of 1854 any alteration has taken place in the sanitary condition of these two classes of localities.

(Signed) _____

(*Stating Qualifications.*) Medical Officer.

(*Date.*) _____

The Medical Officer is requested to address his replies to T. Taylor, Esquire, Secretary, General Board of Health. It is not necessary to prepay the postage.

Note.—If any other point should deserve notice, it should be inserted at the end, under the head of General or Special Remarks.

DIRECTIONS and REGULATIONS of the GENERAL BOARD of HEALTH, issued under authority of the Nuisances Removal and Diseases Prevention Act, 1848.

IN exercise of the authority vested in us, we, the General Board of Health, direct the guardians and overseers in all unions, parishes, and places in England and Wales, as follows :—

I. To have made out a list of the places within the union or parish where cases of cholera, diarrhœa, or any epidemic or endemic

disease, may have lately been frequent, and to give the list or portions of the list relating to the particular districts to the medical officer of each district to which it shall relate.

And to require the medical officer to visit the places within his district named in such list, and examine the houses as to their present condition, or as to any predisposing and removable causes of disease likely to affect the inmates.

II. To direct their medical officer to give a written list to the guardians of all places in a state dangerous to health, or needing cleansing, and of filthy and unwholesome dwelling houses, and of all nuisances within his knowledge that may be abated, cleansed, and removed under these regulations.

III. To see that all town councils, commissioners under Local Acts, local boards of health, highway boards, surveyors and district or assistant surveyors of highways, road trustees or commissioners, county surveyors, and others now by law entrusted with the control of streets and places within the parts to which these directions and regulations extend, do exert their powers for the cleansing of all places under their control, particularly those included in the above list of the medical officer.

IV. To see that places not entrusted by law to the care of any town council, local board of health, commissioners, surveyors, trustees, or others, are kept clean by owners or occupiers of houses or tenements adjoining by effectual washing or otherwise, and with the use of such disinfectants as the medical officer shall direct.

V. Where there is any default in cleansing or removing nuisances by neglect of any such town council, local board of health, commissioners, surveyors, trustees, or others, or by reason of poverty of occupiers or otherwise; to cause such places to be cleansed, and all nuisances to be removed therefrom.

VI. When any dwelling house is in such a condition as to be a nuisance or injurious to health; or,

Where upon, adjoining to, or near any premises or place as aforesaid, there is any drain, ditch, gutter, watercourse, privy, cesspool, or ashpit, kept or constructed so as to be a nuisance or injurious to health; or,

Where upon, adjoining to, or near any such premises or places, swine or any other animal, or any accumulation of dung, manure, offal, filth, refuse, or other matter or thing, shall be kept so as to be a nuisance or injurious to health;

To see that the owner or occupier, or the person having the care of such dwelling house or premises, or the person causing the nuisance, forthwith cleanses, whitewashes, ventilates, or otherwise purifies, as the case may require, such dwelling house or premises, or otherwise abates or removes the nuisance or matter injurious to health.

And if default be made herein by reason of the poverty of the owner, occupier, or other person or otherwise, and complaint shall have been made as herein-after provided;

To see that the local authority empowered to act in the place where the premises complained of shall be situate, or, if there shall be no such local authority, or the local authority shall delay for an unreasonable time,—themselves to take all proper means for carrying into effect the directions above prescribed for the owner or occupier.

VII. When any complaint under the 1st section of the Nuisances Removal and Diseases Prevention Act, 1848, or any certificate under the Nuisances Removal and Diseases Prevention Amendment Act, 1849, is made to the guardians, to cause proceedings to be taken under the first section of the former Act; or to forward the complaint to any other local authority who may have legal power to deal with the nuisance; or if there has been previous default on the part of such local authority, forthwith, if necessary, to proceed on the complaint themselves, under the said Acts.

VIII. Where they consider the case one of urgency, to cause any such dwelling house or premises to be cleansed and purified, and any such nuisance as herein-before described, to be forthwith removed and abated, without any previous complaint being made or to the local authority.

IX. To order every medical officer upon any unusual amount of diarrhœa, or any case of cholera becoming known to him within his district, to report the same to the guardians.

X. Where cholera is present or imminent;

To provide sufficient medical aid for house to house visitation, and for medical treatment of the sick, and for dispensing medicines, and issuing notices stating where such aid and medicines have been provided.

XI. To provide places for accommodating necessitous sick who cannot be properly treated in their own houses.

XII. To provide places to which may be removed the families or fellow lodgers of necessitous persons attacked with cholera, and to cause the dwellings from which persons may have been so removed to be cleansed by the owners or persons having the care of them, or, in their default, by the guardians.

XIII. On the occurrence of any case of cholera in any room occupied by one family or more, to cause the removal either of the patient or of so many of the occupants as the medical officer may deem necessary.

XIV. To provide when practicable and necessary, in case of death by cholera, for the speedy removal and interment the body.

XV. To make arrangements for obtaining daily lists of persons attacked by cholera within the Union, and for communicating the same weekly to the General Board of Health.

XVI. To appoint such medical and other officers as may be necessary to execute and superintend the execution of these Regulations, and to publish and circulate notices of the provisions of the said Acts for the prevention of nuisances, and of our directions and regulations, or such part of them as may appear expedient.

In these directions and regulations, the words "Guardians of the Poor" mean the guardians, directors, wardens, governors, or other like officers having the management of the poor of any union, parish or place where the matter requiring the cognizance of any such officers arises, and the expression "Local Authority" means the town council, local board of health, or any trustees or commissioners for the draining, paving, lighting, cleansing, managing, or directing the police of any town, borough, or place, highway board or any other body of a like nature, or any commissioners of sewers, or any body, excepting boards of guardians and overseers, having by law powers for the removal of nuisances.

Given under my hand and under the seal of the General Board of Health, this Eighth day of September One thousand eight hundred and fifty-four.

(L.S.) B. HALL.

DIRECTIONS and REGULATIONS of the GENERAL BOARD of HEALTH, issued under the authority of the Nuisances Removal and Diseases Prevention Act, 1848.

IN exercise of the authority vested in us, we, the General Board of Health direct,

I. All surveyors, district or assistant surveyors of highways, trustees, county surveyors, and others by law entrusted with the care and management of streets and public ways and places, and where there are no public authorities so entrusted, the owners and occupiers of houses and tenements adjoining thereto, to take the measures necessary for the frequent and effectual cleansing thereof.

II. The owners and occupiers, and persons having the care and ordering of all houses, dwellings, churches, buildings, and places of assembly, to cleanse, purify, ventilate, and disinfect the same.

III. All local authorities and persons whatsoever to exert all the powers vested in them by law for the removal of nuisances.

IV. All relations of, or others in charge of the bodies of, persons who have died of cholera or other epidemic disease, to obey the directions of the medical officers of the guardians, as to the speedy interment of the dead.

In these directions and regulations, the word "Guardians" means the guardians, directors, wardens, governors, parochial board, or other like officers having the management of the poor of any union, parish, combination, or place where the matter requiring the cognizance of any such officers arises; and the expression "Local Authority" means the town council, local board of health, or any trustees or commissioners for the draining, paving, lighting, cleansing, managing or directing the police of any town, borough, or place, highway board, or any other body of a like nature, or any

commissioners of sewers, or any body, excepting boards of guardians and overseers, having by law powers for the removal of nuisances.

Given under my hand and under the seal of the General Board of Health, this Fourteenth day of September One thousand eight hundred and fifty-four.

(L.S.) B. HALL.

General Board of Health,
Whitehall, September 1854.

SIR,

I am directed by the General Board of Health to enclose to you, with the regulations and directions issued by the Board in pursuance of the 10th section of the Nuisances Removal and Diseases Prevention Act, (11 & 12 Vict. c. 123) the various publications of the Board prepared for local information and guidance under this distressing visitation.

I am to impress in the strongest terms upon the minds of the parochial authorities the heavy responsibility thrown upon them by the provision of the law which makes it their business during an epidemic to see executed, or to execute themselves, the regulations and directions of the Board.

These regulations and directions are of two classes; the first class is aimed at the most prevalent forms of nuisance, (in so far as the law permits this Board to reach them) and these nuisances it is the duty of the parochial authorities to see removed by those who have the legal control of the premises, or in default of any on whom this duty may be enforced, themselves to remove them in the manner pointed out by the Act.

This is peculiarly a preventive work, and its object is to do away with the state of things which experience has proved to be most likely to bring down the epidemic in particular spots.

But when the epidemic comes, it is too late to trust for safety to the execution of these directions only.

At this point that other class of the Board's regulations and directions which provides for medical relief should come into play.

The directions on this point are general and brief.

But with them is sent a minute of instruction, which sets out in the fullest detail the arrangements by which medical aid may be placed within reach of all who require it, and, where necessary, house-to-house visitation established, houses of refuge provided, and all other measures taken which the actual presence of the epidemic renders necessary.

If the will to do this duty exist on the part of the parochial authorities this minute supplies all the information required to enable them to carry out their duty in practical working.

Where arrangements in accordance with that minute have been conducted in a judicious and not niggardly spirit, experience has proved that the ravages of the epidemic may be confined within very narrow limits.

It should not be forgotten that the duty of making such arrangements is not one imposed on the parochial authorities by humanity only, but that it is also a work laid upon them by the law, the neglect of which is made punishable by the statute which imposes it. For although the members of parochial bodies are elected of their own free will, yet, when they have voluntarily accepted the responsibilities of an office, the law will not allow them to neglect their duties to the inhabitants of the district they are acting for, in so far as the Legislature has intrusted them to their care.

The purpose of this letter is to state the Board's view of the nature of these duties and responsibilities (in reference to epidemic disease), in order that local authorities may not be able to avail themselves of the plea of ignorance, should the imputation of neglect be brought home to them.

I have the honour to be, Sir,
Your obedient Servant,
T. Taylor, *Sec.*

Removal of Nuisances.

The intimate connexion between filth, foul smells and disease being assumed to be generally admitted, and many applications being daily made to this Board either to remove nuisances, or to give information how the removal of nuisances can be effected, the following plain directions for that purpose, will, the Board believe, be found useful at this moment.

The nuisances which may be dealt with under "The Nuisance Removal and Diseases Prevention Act, 1848," (11 and 12 Vict. 123), and the Regulations and Directions of the General Board of Health, issued in pursuance of that Act, broadly classed, are of two kinds.

1st. Nuisances removable by cleansing, such as filthy house walls, overcharged cesspools, unscavenged streets, foul dust bins, manure heaps, ash-pits, dirty pigsties, &c.

2d. Nuisances requiring the construction of works for their removal, such as houses unwholesome for want of drains, accumulations of liquid refuse requiring drains to carry them off, &c.

Consider to which of these classes the nuisance you complain of belongs.

I. How to get rid of nuisances removable by cleansing.

If to the 1st class, *address a short intelligible complaint of the nuisance, in writing, to any existing body having authority to make local improvements;* as the town council, board of trustees, or commissioners for the repair, paving, lighting, cleansing or draining of the highways, the highway board, or any other similar body; or, in default of any of them, to the Board of Guardians.

The Board's regulations prescribe no particular form for this complaint, but it should be precise in describing the place or giving the address of the premises where the nuisance is.

It is the duty of each and all the above local authorities, immediately on the receipt of such complaint as above, to make inquiry and take such measures as may be necessary for its removal, or in default of their doing

so, the Guardians, under the regulations and directions which have been issued to them, are to make inquiry into the complaint, and if they find that it is well-founded, to call upon the persons having power by law to remove it, to do so.

If these persons neglect or omit to remove the nuisance,

The Guardians have power, and it is their duty to remove it, instead of these persons—and they are empowered to proceed against the defaulters (if culpable) for a penalty under the Act, up to 5*l.*

II. How to get rid of nuisances removable by constructing works.

To do this requires a less summary and simple process.

The proper mode of proceeding in this case is not, as in the former, under the regulations and directions of the General Board of Health, but under the 1st section of the Nuisances Removal Act, addressed to *any existing body having authority to make local improvements;* as the town council, board or trustees or commissioners for the repair, paving, lighting, cleansing, or draining of the highways, the highway board, or any similar body; or, in default of any of them, to the Board of Guardians in the form given by that Act.

A complaint must be signed by two householders, or the nuisance must be certified to the Guardians by the medical relieving officer of the union, or, if it exist in or about a common lodging-house, by a police constable, or inspector of common lodging-houses.

On this the local authorities, and, in default of them, the Guardians, are bound, after examination into the case, or without examination, on the written certificate of two legally qualified medical practitioners, to complain before a magistrate, who can summon the owner or occupier of the premises where the nuisance exists, before two justices (or in London before any police magistrate) and on hearing of the summons an order may be made for the removal or abatement of the cause of complaint.

If this order be not obeyed, it is the duty of the local authority instituting the complaint to carry the order into effect, and the cost falls on the persons on whom the order was made.

As nothing in the Nuisances Removal Act is to interfere with the jurisdiction of the Commissioners of Sewers (sect. 5), when the order is one which involves an authority from them, it should require the execution of the work conformably to the regulations of those Commissioners, who have declared themselves ready to co operate with the local authorities and Guardians to the utmost in carrying out the provisions of the Act.

They will furnish information, at their district offices,* as to the state of the sewerage of particular localities.

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* Branch Office for the Tower Hamlets and Poplar districts, and Finsbury division—No. 15, Great Alie-street, Goodman's-fields. Office hours 9 o'clock A.M., to 4 P.M.

Principal office of the Commission, and branch office for the Holborn division, and eastern and western divisions of Westminster and Regent-street, and Regents-park district—1 Greek-street, Soho. Office hours, 9 o'clock A.M., to 4 o'clock P.M.

Branch office for portions of the Ranelagh Counters Creek, and Fulham and Hammersmith districts—No. 22, Inverness-road, Bayswater. Office hours, 10 o'clock A.M., to 12 o'clock at noon.

Branch office for portions of the Ranelagh Counters Creek, and Fulham and Hammersmith districts—No. 45, Grove-place, Brompton. Office hours, 10 o'clock A.M., to 12 o'clock at noon.

Branch office for the whole of the district south of the River Thames—No. 64, Borough-road. Office hours from 9 o'clock A.M., to 4 o'clock P.M.

Short Recommendations to Guardians in times of Choleraic Disease,

In execution of the powers derived from the regulations and directions of the General Board of Health, issued under Order in Council.

1. Divide your union amongst committees of the guardians

2. Give your medical officers assistance if they require it.

3. Direct your chief attention to places where diarrhœa prevails, or where fevers or other epidemic disease have generally been most prevalent. Your medical and relieving officers know these places.

4. Look to the cleansing of roads, streets, and courts; and see that surveyors, paving and improvement commissioners, and others, having by law power to cleanse, carry out their powers.

5. In their default, or when they have no power, yourselves see to the cleansing of such streets, roads and courts. In the courts of poor neighbourhoods, where refuse is thrown on the public way, wash the surface daily with streams of water.

6. Appoint a committee for the receipt of complaints of nuisances, and see that the proper officer attends to such complaints, and reports what he does therein.

7. In all cleansing operations, where foul smells may arise, let disinfectants, such as quick-lime, peat-charcoal, chloride of lime or of zinc, or chlorine gas, disengaged by pouring sulphuric acid on common salt, in the proportions of a wine glassful of the acid (common oil of vitriol) to a pint of salt, be freely used.

8. Filthy houses should be lime-washed, and accumulations of all kinds promptly removed without expense to the occupant, when poor.

9. Let the paramount importance of free ventilation in all houses be constantly and most urgently inculcated.

10. Insist on the greatest possible cleanliness in the vagrant wards of union-houses, and in common lodging-houses; and enforce, as far as possible, personal cleanliness on the part of the inmates of those places.

11. Look to the water in your district, and adopt every practicable means to ensure its supply in a state of purity.

12. Direct your medical officers to report to you any unusual prevalence of bowel complaint or diarrhœa, and any case of cholera, in their respective districts.

13. On the earliest appearance of choleraic disease, assemble your medical officers, and carry out, as far as may seem necessary, the instructions of the General Board of Health as to preventive measures, dispensaries, and medical aid, which instructions have already been supplied to you by that Board.

14. Make known your arrangements for relief by plain hand-bills, freely circulated.

15. Give warning, by hand-bills, of the importance of applying, on the first symptoms of diarrhœa, to your medical officers, for advice and medicine, and that the same will be given gratuitously.

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For Her Majesty's Stationery Office.

REPORT

ON THE

COMMON AND MODEL LODGING HOUSES OF THE METROPOLIS,

(WITH REFERENCE TO EPIDEMIC CHOLERA IN 1854,)

BY

GEORGE GLOVER,

SUPERINTENDING MEDICAL INSPECTOR, GENERAL BOARD OF HEALTH;

FORMERLY VICE-PRESIDENT ROYAL SCOTTISH SOCIETY OF ARTS AND PRESIDENT ROYAL MEDICAL SOCIETY;

LECTURER ON NATURAL PHILOSOPHY AND MEDICAL PHYSICS, ROYAL COLLEGE OF SURGEONS, EDINBURGH.

Presented to both Houses of Parliament by Command of Her Majesty.

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FOR HER MAJESTY'S STATIONERY OFFICE.

1855

General Board of Health,
20th January 1855.

The Right Honourable Sir Benjamin Hall, Bart., &c.,
President of the General Board of Health.

Sir,

In compliance with your instructions, I have made a personal inspection of the different model lodging houses in the metropolis, with the view of ascertaining how far the improved sanitary arrangements introduced in them have been successful in warding off the attack of epidemic cholera. I have also deemed it in accordance with your views to carry my inspection further, and to inquire what influence the operation of the Common Lodging Houses Acts has had upon the health of that portion of the inhabitants of the metropolis who are compelled to become inmates of these places. The statement appended will doubtless create surprise; but in order to insure accuracy I have deemed it advisable to give the returns from the Metropolitan Commissioners of Police, in the same form that I received them.

I have the honour to be,

Sir,

Your most obedient servant,

Geo. Glover.

REPORT.

COMNON LODGING HOUSES.

In the report of the Commissioners of Inquiry into the state of large towns, especial attention was directed to the common lodging houses. Overwhelming evidence was adduced from all parties,* showing that these houses were especially the sources of epidemic diseases. In the report of the Metropolitan Sanitary Commissioners 1847, numerous facts of a similar character and leading to the same conclusion are set forth. In 1849, the common lodging houses suffered severely from epidemic cholera. In Tindall's Buildings, Gray's Inn Lane, from fifteen to twenty cases of cholera† occurred in a single lodging house, and in another, in the same buildings, twenty cases of fever originated. In Church Lane, St. Giles', in thirty dwellings, where nightly lodgers were received, twenty-eight deaths from cholera were registered.‡ In Cooper's Court, Blue Anchor Yard, Windmill Street, Rosemary Lane, and Blue Yard, Whitechapel, almost all the houses being noxious common lodging houses, cholera was severely felt, and out of a population of 750, twenty died of cholera and diarrhœa.

In 1849, in houses in Jenning's Buildings, Kensington, used as lodging houses, and containing a population of 750, the mortality from cholera and diarrhœa alone amounted to twenty, being in the proportion of 266 to 10,000 living, while the mortality from all causes, was in the proportion of 440 to 10,000.

Among many instances that have come under my own notice during the last twenty years, I may state the following:—From a single room in a common lodging house in Aird's Close, Grass Market, Edinburgh, above forty cases of fever were removed to the hospital during the epidemic fever of 1847. The medical officer of the district, who attended them in the first instance, fell a victim to the

* See Report of Commissioners on state of large towns and populous districts, 1845.

† Report on the present state of certain parts of the metropolis. R. Grainger, Esq., 1851.

‡ Registrar-General's Report, cholera.

disease. Many instances of a similar character have occurred in the metropolis.

So strongly were the evils of the common lodging houses impressed on the General Board of Health, by reports made to them, and by the Official Reports of previous commissions, that in the session of 1851 the Earl of Shaftesbury, then Lord Ashley, introduced a Bill for their better regulation. The Bill became law in July 1851; the carrying of it out being entrusted to the Metropolitan Commissioners of Police.

Captain Hay, the Commissioner of Police, in his first report on the Act, thus describes the character of these houses:

"With a sincere desire to ameliorate the wretched condition " of the lodgings of the poorer classes, I cheerfully received " directions from the Secretary of State to take under my " charge the common lodging houses as a new branch of " Police duties.

" I was the more readily induced to undertake this onerous " duty from the strong representations made by the General " Board of Health of the miserable state of these dwellings, " which that board described as the great source of contagious " and loathsome diseases.

" This inducement was strengthened by the report of " the Constabulary Commissioners, representing these houses " as the hotbeds of crime and moral depravity amongst that " class of the population which is obliged to resort to them.

" In the metropolis the common lodging houses are sources " of streams of mendicants to all parts of the country; they " are a refuge for them, and in many cases are in fact most " infamous brothels, yet in these places are to be found " industrious emigrant labourers, with their wives and children, " driven into them for want of other suitable shelter."

The beneficial working of the Act was soon apparent; lodging houses were registered; the number of inmates was restricted; regulations were enforced for the separation of the sexes, for the proper cleansing of the houses, for ventilation, and for compelling the lodging house keeper to give immediate notice in writing to the Commissioners of Police of any case of fever, or any infectious or contagious disease occurring, and immediately to remove other lodgers from the room where the case occurred, and to use such disinfecting processes as might be directed by the Commissioners Proper attention was also directed to prevent the accumulation of refuse; and provision made for proper water-closet accommodation, better drainage, and sufficient water supply.

The Act (amended by the Act of 1853) has now been in practical operation for three years, and although it was not to be expected that its working would in so short a time remedy all the evils for which it was passed, it is unquestionable that its results, especially with reference to the diminution of epidemic disease, have been far greater than even the most sanguine had anticipated.

Captain Hay, in his Second Report, states, "that in the "year 1853 there were common lodging houses permanently "registered accommodating about 30,000 persons. It is "gratifying to observe the successful result of the operation "of the Act in preventing disease. During the year only ten "cases of fever have occurred in the registered houses, five "of which were removed to the hospitals by direction of "the Police."

Considering the class of persons inhabiting these houses, it must be acknowledged that three cases of fever to every ten thousand of such persons is an almost incredibly small amount of sickness of this character.

With the view of ascertaining whether similar results had been witnessed in relation to cholera during the recent outbreak of that disease, I have obtained from the Commissioners of the Metropolitan Police the following returns:

Weekly State of Common Lodging Houses within the Metropolitan Police District for Week ending the 8th Day of October 1854.

Variation in the State of Common Lodging Houses within the Week.	First Reported.			Result of Inspection of Houses.						Registration of Houses.	
	Number of Houses reported.	Number of which Keepers are served with Notice.	Number of Houses not yet served with Notice.	Number of Houses not coming within the Act, and given up prior to Registration.	Number of Houses of which the Notices to "register" have not expired.	Number of Houses of which Notices to "register" have expired.			Number of Houses permanently registered.	Number of Houses given up.	Number of Houses remaining on the Register.
						Discontinued to take Lodgers, but are necessarily under Observation.	Notices of "Alterations" not complied with.	Number of Houses to survey.			
Total state of previous week	10,261	10,261	—	3,832	241	1,772	801	1,903	1,712	405	1,307
Operations of present week - Add	23	23	—	36	23	4	30	—	9	—	9
" surveyed - do.	—	—	—	—	—	—	20	—	—	—	—
" re-opened - do.	—	—	—	—	—	—	—	—	—	—	—
	10,284	10,284	—	3,868	264	1,776	851	1,903	1,721	405	1,316
Operations of the week deducted to adjust the state. Permanently registered - 9 deduct	—	—	—	—	—	—	49*	—	—	—	—
Not within the Act, and given up - - - 36 do.*	—	—	—	—	—	—	—	—	—	—	—
Discontinued to take lodgers 4 do.	—	—	—	—	—	—	—	—	—	—	—
Notices to register expired - 30 do.†	—	—	—	—	30†	—	—	—	—	—	—
To survey - - - - do.	—	—	—	—	—	—	—	20	—	—	—
Surveyed - - - - do.	—	—	—	—	—	—	—	—	—	—	—
Given up after Registration - do.	—	—	—	—	—	—	—	—	—	—	—
Re-opened - - - do.	—	—	—	—	—	—	—	—	—	—	—
Actual state for week ending 8th Oct. 1854 -	10,284	10,284	—	3,868	234	1,776	802	1,883	1,721	405	1,316

(Signed) W. Hay, Commissioner.

(Signed) James Humphreys, Registering Inspector.

From this it appears that altogether 10,284 common lodging houses are more or less under the superintendence of the police, although only 1,721 are as yet permanently registered.*

The next return gives the amount of sickness, and the deaths from cholera, fever, and small pox, from the 1st January to 1st October of the present year.

METROPOLITAN POLICE DISTRICT.

RETURN of CASES of CHOLERA, FEVER, and SMALL POX that have occurred in COMMON LODGING-HOUSES from 1st January to 1st October 1854.

CHOLERA in			
Registered Common Lodging Houses.		Not registered Common Lodging Houses.	
Cases.	Deaths.	Cases.	Deaths.
34	26	38	35
FEVER.			
3	—	5	2
SMALL POX.			
—	—	5	1

The non-registered houses are those that require certain improvements, repairs, &c. to make them into compliance with the regulations of the Secretary of State, prior to registration. A copy of these regulations is given to each keeper, and fully explained to him by the inspecting serjeant of the district, when time is given (and often extended from time to time) to enable the keeper to make such alterations as may be found necessary. Should these means not succeed, the keeper is summoned before a magistrate; and here again considerable delay often occurs, and in many cases the houses are in too ruinous a condition to be

* The number of persons inhabiting registered common lodging houses is estimated at 32,000; the number inhabiting all these houses, registered and unregistered, at 82,000; leaving for the unregistered, 50,000.

registered without a great outlay, which the owners will not expend, and the occupiers, who are summoned from time to time until they leave the house or discontinue to receive lodgers, cannot incur, on account of their poverty.

JAMES HUMPHREYS,
Registering Inspector.

From the above it appears that in all the lodging houses, both registered and non-registered, there have been only seventy-two cases of cholera and sixty-one deaths; an amount of sickness and mortality, considering the population, the character of the inmates of these houses, and the localities where they are situate, astonishingly small. To make this clearer, however, I have prepared the following tables:

TABLES showing the CASES and DEATHS from CHOLERA, FEVER, and SMALL POX in the REGISTERED and NON-REGISTERED COMMON LODGING HOUSES in the METROPOLIS, under the SURVEILLANCE of the Metropolitan Police, from 1st January to 1st October 1854.

REGISTERED HOUSES.

Number of registered Houses.	Estimated No. of Inhabitants.	Cholera.				Fever.				Small Pox.			
		Attacks.	Deaths.	Proportion per Cent. of Deaths to Attacks.	Proportion per Cent. of Deaths to Population.	Attacks.	Deaths.	Proportion per Cent. of Deaths to Attacks.	Proportion per Cent. of Deaths to Population.	Attacks.	Deaths.	Proportion per Cent. of Deaths to Attacks.	Proportion per Cent. of Deaths to Population.
1,721	32,000	34	26	76·5	·08	3	–	—	—	–	–	—	—

NON-REGISTERED HOUSES, but under INSPECTION, and NOTICES served upon "KEEPERS"

4,695	50,000	38	35	92·1	·07	5	2	40	·004	5	1	20	·002

REGISTERED and NON-REGISTERED HOUSES.

6,416	82,000	72	61	84·7	·074	8	2	25	·002	5	1	20	·001

TABLE showing the MORTALITY from CHOLERA in Thirteen Weeks in every 10,000 of the Population in several Superintendent Registrars' Districts of the Metropolis, and in the Common Lodging Houses under the Superintendence of the Metropolitan Police.

NAME OF DISTRICT.	Estimated Population in round Numbers.	Deaths from Cholera in 13 weeks, 1854.	Deaths to 10,000 living.
Bermondsey	50,000	810	162
St. Olave Southwark	20,000	293	146
Rotherhithe	18,000	260	144
St. James Westminster	37,000	483	130
St. Mary Newington	65,500	660	107
St. George Southwark	52,000	517	99
St. Saviour's	36,000	466	129
Whitechapel	80,500	298	37
St. Marylebone	160,000	319	19
Hampstead	12,000	14	12
Metropolis	2,500,000	10,118	44
Lodging Houses under the superintendence of the police	82,000	61	7

The above documents would seem to prove that the inmates of the lodging houses have suffered less from cholera than almost any other class in the metropolis. This result is of so startling a character that some doubts naturally arise as to whether the police return can be taken as absolutely correct, or merely as an approximation to the actual amount of mortality. Assuming that the Metropolitan Police are correct as to the actual number of deaths from cholera that occurred in the common lodging houses; it is very probable that many cases originated in the houses which ended fatally elsewhere. This may have happened without the knowledge of the police; not from any neglect on their part, but from such causes as the following: the population of these houses is migratory; they are nightly lodgers, and as a rule do not occupy the same house two nights consecutively; it is very possible that in many cases lodgers attacked with premonitory symptoms may have left such houses to suffer, and, perhaps, die, elsewhere: the keepers of these common lodging houses have a special interest in keeping the police, as far as possible,

in ignorance of the appearance of epidemic disease in them, and also in refusing admission to any one complaining of or threatened with cholera or other epidemic disease, both because of the expense of the cleansing operations which would immediately be ordered, and if a death were known to have occurred on their premises their houses would be deserted by the other inmates, and afterwards shunned: Lastly,—and this is the most important reason of all,—the surveillance of these houses by the police is necessarily incomplete. Complete inspection (including daily and nightly visits) would require a much larger force than is at the disposal of the Commissioners for this purpose. Still, after making all the deductions that the operation of the above causes may render necessary, there can be little doubt that the Common Lodging House Acts have materially contributed to the preservation of that portion of the population of the metropolis who have no settled place of abode.

The comparative immunity of the lodging houses, as shown by the return above quoted, is the more extraordinary when it is borne in mind that they are situated generally in the worst and most confined localities, that they are filthy and crowded, and that the tenants belong, as a rule, to the lowest and most profligate class. That the Common Lodging House Acts would diminish the amount of epidemic disease in these abodes of wretchedness was anticipated by the nobleman who introduced and by all who promoted them, but that in so short a time such striking fruits of their operation would appear not even the most sanguine could have looked for. But the startling nature of the figures above given will in itself diminish their value in many minds. Nor can it be denied that the operation of such causes as have been above pointed out, goes far to impair confidence in the completeness of the police returns that have been quoted. No such drawback exists to our acceptance of the facts which follow with respect to the health of the inmates of the model lodging houses during the prevalence of the epidemic; and on them the advocate of sanitary improvement may rest without fear of being shaken.

MODEL LODGING HOUSES.

Houses belonging to the Society for improving the condition of the Labouring Classes.

This society, the first of the kind established (with the exception of the Labourers Friend Society, to which it is now united), was founded for erecting, by means of voluntary contributions, buildings and tenements which should serve as models for general use, and it was intended to apply the profits to the erection of other houses of a similar character. One of the principal objects of the society has been to show that the investment of capital in such erections is perfectly compatible with a fair mercantile return, while very much better accommodation than they now enjoy is thereby secured for the poor. The tenements are let at prices little if at all higher than those charged in the common lodging houses, which, until the introduction of the Common Lodging House Act, were a disgrace to the metropolis; and it is gratifying to find, that, with the exception of the house in Hatton Garden, originally intended for single women, but recently altered for the reception of single men, (on a similar principle to that of the Soho Chambers, belonging to the Metropolitan Association for improving the dwellings of the industrious classes,) all the tenements have been fully occupied, especially those erected for the reception of families.

The first buildings erected were the model buildings, Bagnigge Wells, capable of containing twenty-three families and thirty aged women. Out of the twenty-three houses, nine are constructed for single families, and consist respectively of a living room on the ground floor, having an enclosed recess or closet large enough to receive beds for the youths of the family, two bed-rooms on the upper floor, and a small yard at the back. These houses are let at a rental of 6*s.* a week, and are fully occupied. The remaining fourteen families are distributed in seven houses, each occupying a floor of two rooms, with all requisite conveniences. The apartments on the upper floor are approached through an outer door distinct from that leading to the lower floor, so that each floor constitutes an entirely separate dwelling. The rent charged is 3*s.* 6*d.* per week each per tenement. They are all fully occupied. The use of a wash-house and drying ground are also furnished at a small charge. The accommodation for single aged women consists of one room for each, with the use of a wash-house common to all. The rent per room is 2*s.* per week. The rooms are fully tenanted

An ample supply of water from the New River Company is laid on to all the houses, and there is good water-closet accommodation. It is gratifying to state that in these several premises, which contained a population of 170, there has not been a single case of sickness during the late epidemic, although many of the tenants were of the very age and circumstances to render them, under ordinary conditions, peculiarly susceptible of the disease.

Renovated Lodging House, Charles Street, Drury Lane.

The next step taken by this society was to try what could be done with some of the very bad lodging houses, and accordingly they took the premises in Charles Street, Drury Lane. This house formerly consisted of three of the worst common lodging houses in the metropolis. They are situated in a most unhealthy and confined locality, and were the general resort of prostitutes and thieves. The houses in the street at the present moment are chiefly lodging houses of the old class, and, although now under the surveillance of the police, are still tenanted by the worst characters.

The house belonging to the society is calculated to accommodate eighty-two nightly male lodgers, at a charge of 4*d.* per night, the sum charged in the adjoining houses; but should any one remain a week the charge is reduced to 2*s.* Although the sleeping accommodation afforded is far superior to that in the other houses in the neighbourhood, yet it appears to me that it would be better to restrict the lodgers to a less number. There is an ample supply of water, a good coffee and cooking room, scullery, and good water-closet accommodation. The society states that of all their houses this pays the best. The house has during the last three months been well occupied, although not always full, as in the summer and autumn a large number of the poorer classes are employed in agricultural pursuits, such as pea picking, hop picking, &c. It is however most satisfactory to be enabled to state that during the whole of the epidemic there were only five cases of very slight diarrhœa in these houses, and these were confined to men employed in the neighbourhood of the Tower and Docks, who returned unwell from their work. One case of cholera occurred which can hardly be said to have been contracted in the house, as the individual in question had suffered from diarrhœa for nine days, and was in a state of great destitution. He died in King's College Hospital. The immunity these houses have experienced shows what may be done

even by partial sanitary arrangements to improve the condition of the poorer classes, as in this establishment the large majority of tenants are nightly lodgers.

The Model Lodging House for Working Men in George Street, St. Giles'.

This establishment, which was opened on the 18th May 1848, is constructed to contain 104 single men. The arrangements are admirable. The dormitories are ten feet high, and are subdivided by wooden partitions six feet nine inches high. The coffee-room is thirty-three feet by twenty-three feet, and ten feet nine inches high. There is an ample supply of hot and cold water. The ventilation is secured by means of a shaft carried up at the end of every room, as well as a shaft up the staircase to supply the dormitories with fresh air, with a provision for warming, if required. In this house the tenants are weekly lodgers, and pay a rental of 2*s.* 4*d.* per week. This establishment is always full. Neither in 1849 nor during the present year has any case of cholera or diarrhœa occurred. The position of this model building is of importance as showing what may be done for preserving the health of the poor in the lowest neighbourhoods. In immediate contiguity to it is the notorious locality of Church Lane and Carrier Street, St. Giles, with its numerous courts and alleys, tenanted by the lowest of the low, and where, until the Lodging House Act came into operation, epidemic disease was always present, and which, even now, improved as it has been, is still one of the most notorious fever nests of the metropolis.

Model Houses for Families, Streatham Street, Bloomsbury.

The next and greatest attempt that the society made was the erection of a building to accommodate fifty-three families in such a manner that the domestic privacy and independence of each family might be preserved. The fifty-three sets of apartments, or rather distinct dwellings, consist of a living room, two bed-rooms, a lobby, scullery, water-closet, and dust-bin, bed-closet, sink, and meat-safe. In addition to this, on the basement story is a wash-house, ironing room, and bath-room, the use of which are granted at a trifling cost. The whole building is amply supplied with water. The drainage is good, and ventilation well attended to. The whole building is under the direction of a resident manager or collector, to whom is entrusted the retailing of coals at a

moderate price. The rentals of the sets of rooms vary from 4*s*. to 6*s*. per week, according to position, and in three cases the charge is 7*s* per set. The average number of inmates during the past three years has been 306, a very large proportion of whom were children, but altogether there have been only six cases of diarrhœa, which speedily yielded to treatment, whilst in the immediate neighbourhood (which is densely populated) there has been a large amount of the prevailing epidemic. The general state of the health of the inmates of these model houses during the last three years has been good, the total deaths being only ten, seven of which occurred among children under five years of age, three of whom died of hooping cough, one from pneumonia, one from cephalitis, one from convulsions, and the seventh from some cause not known. The other three deaths arose from consumption. The average annual mortality is therefore less than 11 in 1,000, while in the district where the houses are situated the mortality on an average of seven years has been nearly 27 in 1,000, the mortality from cholera during the past epidemic having been 71, or in the proportion of 11 in 10,000 inhabitants. The result of the sanitary experiment as made in these buildings could not be more satisfactory.

Thanksgiving Buildings, Portpool Lane, Gray's Inn Road.

These buildings were erected principally from the thanksgiving offerings collected on the occasion of the disappearance of cholera in 1849. They are constructed for the accommodation of twenty families and 128 single women. The tenements for the families consist of three and two rooms each, and the single women are accommodated in sixty-four rooms. In addition to these tenements, there is a spacious wash-house for poor families in the neighbourhood. To this are attached hot drying-closets, wringing apparatus, and ironing room. The wash-houses, &c. are most extensively used. The average number of inmates of the buildings during the past three months has been 166, among whom there has not been a single case of sickness during the whole period. The experience of the effects of these buildings on the immediate neighbourhood has been most gratifying. These houses were intentionally erected in what was justly considered one of the worst conditioned localities in the metropolis. The notorious Pheasant's Court, Gray's Inn Lane, immediately abutting on these premises. At first the inmates were constantly disturbed by the nocturnal uproars

in the adjoining streets, but these have gradually diminished, and the manager of the houses informed me that the locality was now the quietest in the neighbourhood.

Model Lodging House, King Street, Drury Lane.

This is similar to the one in use in Charles Street, Drury Lane. It is constructed to contain twenty-five male inmates. It has been almost always fully occupied. There have been no cases of diarrhœa or cholera in this house.

Hatton Garden Chambers.

This building, which was formerly used as a place of business, was taken on lease by the society, and converted at a considerable expense into lodging houses for women, and is capable of accommodating fifty-six inmates. The building is divided into three floors of dormitories, subdivided into separate compartments. There is a spacious kitchen, wash-house, bath, pantry, safe, &c. There is good ventilation, and an ample supply of water. This establishment did not, however, fill as was expected, and it is now let out to single men at a charge of 3*s.* 6*d.* per week each. The number of inmates at present is only twenty eight, owing to the recent alteration in the character of the tenants. It is gratifying to find that there has not been a single case either of diarrhœa or cholera.

In addition to the different buildings thus described, the Society has lately purchased thirteen houses in Wild's Court, Drury Lane. They are at present tenanted by 1,000 persons. The inhabitants are mostly Irish labourers, costermongers, and characters of a very doubtful calling. It is impossible to convey an accurate description of the filth and wretchedness of this locality, or of the scenes enacted there. The accompanying wood cuts, taken by the society previous to their commencing operations, and the extracts from the report of the clerk of the works, &c., Mr. Baxendale, may, however, afford some slight idea of the premises which the society now propose to improve.

"Wild Court is situate on the northern side of Great Wild Street, Lincoln's Inn, and runs in a north-easterly direction into Chapel Place, which leads east into Duke Street, and west through Middle Yard into Great Queen Street.

"The court is paved throughout, and contains fourteen substantially brick-built houses. The beams, joists, and other bearing timbers are principally of English oak, and in

a sound state. Superficially, they are in a very dilapidated state, especially Nos. 2, 3, 4, and 5.

Fig. 1 is a view of the court as seen from Great Wild Street.

Fig. 2 is the front view of the house No. 2.

"Thirteen of these houses have been obtained, each containing eight rooms, except No. 2, which has twelve rooms, independent of the basements. None of the basements are at present occupied, only as lumber places, and are in a most filthy state, emitting at times effluvia the most foul, partly in consequence of the accumulation of animal and vegetable matter which is thrown in through the area windows, and through holes made in the ground-floors, and partly from the occasional overflow of badly constructed "dry" brick drains, which pass beneath the floor, in some instances not more than three inches. There is no paving to these floors.

"The back-yards are from five feet six inches to seven feet wide, very imperfectly drained. At one end is placed a privy without door, and quite exposed.

"In the houses 2, 3, 4, and 5, these places are large open holes, sufficiently capacious for a man to fall into. They have risers and wood rails in front, but no seats. Fortunately, the rails are fixed too high for children, or accidents must now and then occur; this is one reason the yards are constantly in such a filthy state. In the other yards, there has been some attempt to make them more private by putting doors, but in other respects they are quite as bad. Adjoining the privies, in some of the yards, stand the water-butts, so dilapidated as scarcely to hold water; and, generally, the only means the tenants have to draw the water is by a plug in the lower part of the butt. In each of the yards of Nos. 2 and 4, a cement tank is constructed, the latter for the supply of the three houses, Nos. 3, 4, and 5. Several houses are supplied by butts placed in the basement at the foot of the stairs, and quite in the dark. There are loud complaints of the want of water throughout the whole court, especially on a Sunday. This deficiency is principally owing to the means provided for drawing the water, and the rotten state of the butts into which it comes. I have been there at three o'clock in the afternoon, and there has scarcely been a drop of water in the court, and the inhabitants running about the neighbourhood begging for it.

"Dust-bins are placed in one corner of the yards, and generally emptied once a week—sometimes, and I fear very frequently, once a fortnight only. Complaints have often been made of the stench arising from these places, especially

Fig. 1.

View of Wild Court, as seen from Great Wild Street.

Fig. 2.

Front view of the house No. 2.

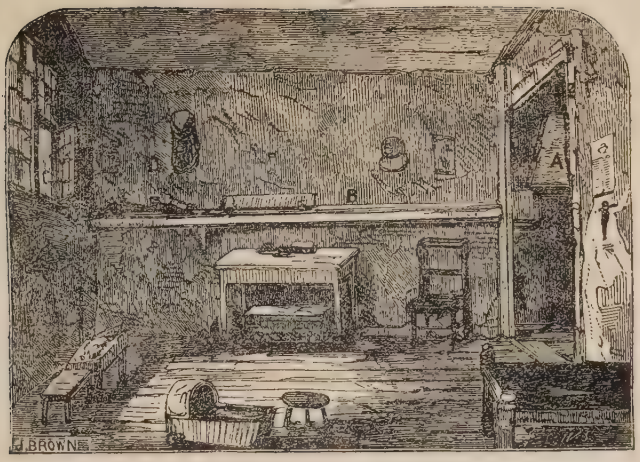
by the tenants occupying the back rooms on the ground-floor. Every morning the yards are abominably filthy, and present more the appearance of large cesspools than anything else. I have seen some of them about six inches deep in places of all manner of soil and filth, through which any person requiring water must wade to the water-butt, as well as to the privy. At times the very passages are covered to the entrance door. I have frequently been unable to get from the stairs to the yard from this disgusting practice.

"I may here observe, that it is not so much the occupants that commit this nuisance, as it is the idle fellows and women who flock to the place at night after dark, and take up their abode on the landings and stairs till the morning; some little allowance must, however, be made for the resident children, for whom not the slightest accommodation is provided. Before closing this subject, I must say a few words on the state in which the roofs and gutters are to be seen any day. It appears, from inquiry and examination, that the families occupying the upper rooms or garrets get rid of their soil and refuse by throwing it on the roofs at the back of the houses. It then passes, in some instances exposed to view in the room, along the gutters arranged on the side of each front attic, to that in front of the houses, thence by the stackpiping to the drains. See fig. 3. Some of these gutters have wood flap covers, partly hinged and partly fixed.

"This is such a striking instance of the total disregard by the occupants to common decency, as well as to their health and comfort, that I have had sketches made showing exactly the state of things. In fig. 3 A is the trap-door, or opening in the roof over the landing of the stairs, as may be seen through the door of the front room, where the occupants empty their slops, &c., which afterwards pass along the gutter B, against the wall in the front room, discharging on the tiles of the front roof, and into the gutter below, as shown in fig. 4. On looking out at the garret windows its appearance is, at times, that of an elongated cesspool, disgusting in the extreme, and the stench arising intolerable.

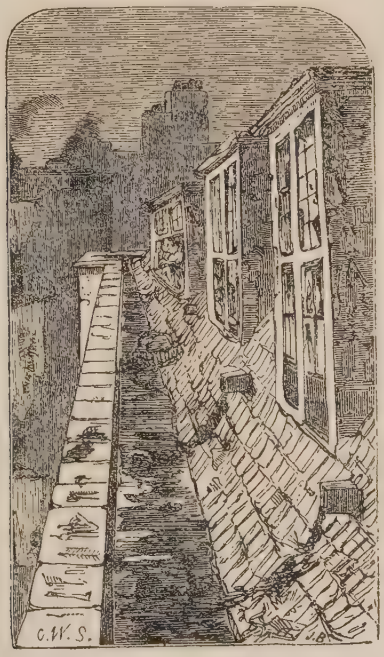
"The ventilation throughout is very imperfect. No provision whatever is made in the attics beyond an opening in the window, or by the side of it, about twelve or fourteen inches square, as shown at C, fig. 3. The other rooms are equally bad. The windows in most of them cannot be opened for the want of lines, weights, or beads. The larger portion of the glass in the windows is broken, and partly pasted over with paper, and partly stuffed up with old rags.

Fig. 3.



Internal view of a front garret, showing the gutter that conveys the soil and slops from this floor to gutter in front, as shown in fig. 4.

Fig. 4.



View of the front gutter, as seen from the garret windows.

Some of the windows are at least two-thirds blocked up in this manner.

"The ground-floor front room, in the house No. 5, has been untenanted between two and three years; and no application has been made for it that I can hear of, because, as I am informed, it has been the well-known haunt for all the thieves and bad characters in King Street, Parker Street, Charles Street, and all the courts and alleys in Drury Lane, as well as Church Lane, &c., who meet every night at the hour of twelve or thereabouts, and there arrange all kinds of mischief. The ingress and egress was by the cellar window, and up a hole in the floor specially made for the purpose. It has been represented to me as a regular den of thieves. I had this place well barricaded up about three weeks ago, and the good already effected can hardly be overrated."

I have deemed it advisable to introduce this description, as it will be very instructive, at some future time, to institute a comparison between the present state of this locality and what it may become after the improvements are made.

Metropolitan Association for improving the Dwellings of the Industrious Classes.

This Association was founded on the principle that the industrious man should pay the full value for his house, but that for the sum he pays he should possess a salubrious and commodious dwelling, instead of one in which cleanliness, comfort, and health can have no place. It was considered practicable to erect healthy and comfortable houses fit for the labourer and artisan, and to offer such improved dwellings at no higher rent than is now paid for inferior and unhealthy houses, and at the same time to obtain a profitable amount of interest for the capital invested. The Association has now been in existence upwards of thirteen years, and the principles upon which it was started are every year approaching complete practical realization.

Six buildings are now erected and occupied; and in addition to these, houses are now nearly completed for sixty families in New Street, Golden Square; other houses for the accommodation of 108 families are in course of erection in Guy Street, Snow's Fields, Bermondsey; premises to be turned into dwellings for ten families situated at Queen's Place, Dockhead, have also come into the possession of the Association.

The society was in existence for seven years before the first of its buildings were ready for the reception of tenants.

Metropolitan Buildings, Old Pancras Road.

These buildings consist of 110 sets of rooms, twenty being sets of two rooms and ninety of three rooms. Attached to each set of rooms is a scullery, provided with a sink, a supply of water at high pressure at the rate of forty gallons per day, and the means of carrying off ashes and other solid refuse through a shaft accessible from the scullery. There is no cesspool on the premises. Each set of rooms is provided with a water-closet. There is a good playground for the children in the front of the buildings, and at the back there is an extensive drying-ground, as well as a commodious wash-house for the use of the families. The rents vary from 3*s.* 6*d.* to 6*s.* 6*d.* per week per set, according to position. These charges are very low, considering the accommodation, for it is not unusual in various poor districts of the metropolis, such as Drury Lane and Whitechapel, to find the rent for a single room amounting to as much as from 3*s.* to 4*s.* 6*d.* per week. On my inspection of these buildings I was not at all surprised to find several families who had resided in the buildings since they were first opened, and in other instances I found families, who, having resided in the building for some time, and having left, were only too glad to return to them, finding they could not for the same sum obtain anything like the same accommodation elsewhere.

These buildings are always full; and the superintendent stated that he always had a list of respectable applicants waiting their turns for admission. The net profits for the year ending 31st March 1854 on the gross outlay (including every cost as for management, water, gas, &c.,) was more than 4½ per cent.

The health of the tenants of these buildings has been satisfactory in the highest degree. In the year 1850 the mortality was only 12·5 to 1,000 living; in 1851 the deaths were 15 to 1,000; and in 1852 the mortality was at the rate of 13 and a fraction to 1,000 living, the average of the three years being only 13·6 to 1,000. This death rate is remarkably low, especially when it is considered that a large proportion of the inhabitants of these buildings consist of children under fifteen years of age. The average mortality for the whole metropolis for the same period was

22 to 1,000, thus giving the buildings an advantage with respect to mortality over the metropolis of 8·4 in every 1,000. The same marked exemption from disease in these buildings has continued during the present epidemic. The total population has been 693, and of these 493 were children. There appear to have been several slight cases of diarrhœa, four of which only, according to the statements of the secretary and superintendent, required medical attendance. At the time of my inspection I could not but be struck with the healthy appearance of the children; instead of the wan pallid countenances and strumous characteristics which generally mark childhood among the lower classes of the metropolis, they wore the stamp of strong health.

Metropolitan Buildings for Families, Albert Street, Spitalfields.

This building is constructed on a uniform plan, allowing one sitting-room, two small bed-rooms, a scullery, water-closet, and dust-shaft to each family. The sitting-rooms are of the dimensions of 12 feet 3 inches by 13 feet 9 inches; one bed-room of the set is 8 feet 9 inches by 9 feet 11 in., and the other 6 feet 6 inches by 11 feet, sculleries 6 feet by 8 feet. The height of all the rooms is 8 feet 6 inches. The building is intended to contain sixty families. The population during the past three months has on an average been 354, of whom 217 were children. The total cost of the building was 11,068*l.*, and the net profits are nearly equal to 4½ per cent.

I visited several of the families in different parts of the buildings, and found them, with one exception, in a healthy and cleanly condition, and well satisfied with their dwellings. The exception was in the case of a young man, aged seventeen, who was dying of consumption.

Previous to the 29th August there had been no cases of cholera and very little diarrhœa in the building. On that day, however, two children of one family, aged respectively five and nine years, went to Victoria Park, being then in good health. The following morning at 7, the eldest was attacked with cholera, and died at 9 P.M. of the same day. The other child was seized at 11 A.M., and died next morning. Two hours after the death of the last child, the mother, who had diarrhœa for some days previously, was attacked, and died four days afterwards; another child died the same day as the

mother. The father, George Cartwright, with five remaining children, then removed, and I am informed are in good health. The disease did not spread to the other families in the building, and no deaths from cholera or diarrhœa have since occurred.

After making the most careful inquiries with respect to the deaths in this family, the only circumstances I can discover favourable to the production of this disease are the following:

First,—overcrowding. The family consisted in all of ten persons, living in three small rooms. Comparing the cubic contents of these rooms with the number of inmates, we have a result of 276½ feet per head, which is much under the allowance of space required during the prevalence of an epidemic influence.

Next,—probable deficiency of food. The husband earned 25*s*. per week. Out of this he had to lodge and to clothe himself and family, who were remarked as being well dressed for their station, and to provide them with food. For rent he paid 15*l*. per annum.

Now, taking into consideration the high price of provisions during the present season, it is highly probable that this family had not sufficient nourishment. But it is right to state that the whole family were apparently very healthy, and were considered by the neighbours as the least likely to be attacked. The house in which the deaths occurred is now unoccupied, and is clean. With the exception of three slight cases of diarrhœa, which easily yielded to treatment, there has been no other sickness of any moment. It is well perhaps here to observe, that, judging from the manner in which cholera in the metropolis generally spreads in the neighbourhood of a dwelling where two or three deaths have occurred, it is fair to assume that, under Providence, the non-diffusion of the disease in this case is due to the arrangements made in these houses for the health of the inmates.

Albert Street Chambers, Spitalfields.

These chambers are fitted up and used as a lodging house for single men, much on the same principle as the model lodging house in George Street, St. Giles, belonging to the Sister Society. Each lodger has a separate bed, so par-

titioned off as to form a distinct chamber. In this building there is a coffee-room, 45 feet by 35 feet, 21 feet 2 inches high; a lecture and school room 37 feet by 21 feet 9 inches, 12 feet high; a reading-room, 28 feet by 21 feet 9 inches, 12 feet 6 inches high. The kitchen is 46 feet by 21 feet 9 inches, 12 feet high. In fact the accommodation afforded in this establishment is of a character rather beyond what would be generally considered necessary for artisans. This building has cost the Association 13,557*l.*, and has been the least productive of all their establishments. It is true that during the year ending 31st March it produced a net profit of 1·4 per cent., but if the results of the former year are taken into calculation there would not be any return. At first this establishment was looked upon with suspicion by artisans, an impression prevailing that to become an inmate of the building was to become to a certain extent a recipient of charity. This impression is now wearing off, as is seen from the fact that the building which can accommodate 234 single men, has for the last three months had on an average 200 tenants.

With reference to the sanitary state of the building, it has been all that could be expected. During the three months that cholera was epidemic, whilst the building was more fully tenanted than at any other period, there have been but three cases of slight diarrhœa and two of cholera, one of which proved fatal. The history of the fatal case is as follows: The lodger, aged forty-five, was taken ill with cholera on Friday, August 4th, removed to the London Hospital the following morning, and died on the 8th of the same month. The pre-disposing cause in this case is obvious. The superintendent states: The man had been a tenant but a few days. On the Wednesday night previous to his being seized he partook of part of a stale crab, which was quite offensive to the person sitting at the same table, to whom he remarked that it was not quite fresh. He ate the remainder for his breakfast on the following morning. On the Thursday night he supped heartily off corned beef, the remainder of which, on its removal on Saturday morning from his safe, was found to be very offensive.

The other case of cholera was that of a man who was seized with the disease whilst he was walking through Smithfield Market on his return to dinner about 12 o'clock on the 5th August. He was removed to the London Hospital the same afternoon, and was cured on the 9th of the same month.

Looking at the fact that the inmates of this building were most of them young men engaged in various pursuits in different localities, it is very remarkable that the disease should have made such little progress.

Soho Chambers, 36, *Compton Street.*

These chambers are constructed to accommodate 128 single men, each being provided with a bed-room, partitioned off, and the use of a good coffee-room, cooking-room, lavatories, a bath, and a library. The rent varies from 3*s.* 6*d.* to 4*s.* 6*d.* per week. During the past three months the total number of inmates has been 187, the average number sleeping there every night having been eighty-eight. The immunity from the pestilence which the inmates of these chambers have enjoyed during the late epidemic is very remarkable, especially when it is considered that in the immediate vicinity, viz., in Berwick Street, Cross Street, Broad Street, Marlborough Street, Compton Street, &c., &c., the inhabitants were dying in large numbers daily. Cholera was, for the time it lasted, more general and fatal in this locality than in any equal area of England during any visitation of the epidemic. In the district of Golden Square (in which these chambers are situated), up to October 7th, no less than 267 persons died from cholera alone, exclusive of the mortality from diarrhœa; and yet in these chambers there was not a single case of cholera, and only seven cases of diarrhœa, none of which proved fatal. This evidence of the beneficial effects of improved sanitary arrangement is the more striking, as the arrangements of the Soho Chambers are not by any means so perfect as in several of the other establishments of this association.

Pelham Street and Pleasant Row.

These premises consist of dwellings for twelve and nine families respectively. The average number of inhabitants is about 120. There have been no deaths from diarrhœa or cholera. Whilst, however, the tenants of these dwellings have escaped the late epidemic, they are subject to much annoyance, or perhaps it would be better to say danger, from the chemical works carried on in the immediate vicinity. At times the sulphurous gases thence arising are so powerful, that fowls, which are kept in large numbers in the neighbourhood, frequently fall down dead. One person stated that she had lost about a hundred.

The inhabitants of the houses in the vicinity complain of frequent giddiness and sickness when these works are in full operation. The proprietor of a sugar refinery and the occupier of a flour-mill adjoining expressed their willingness, on my visiting them, to subscribe even 100*l.* apiece to get the nuisance from these works abated.

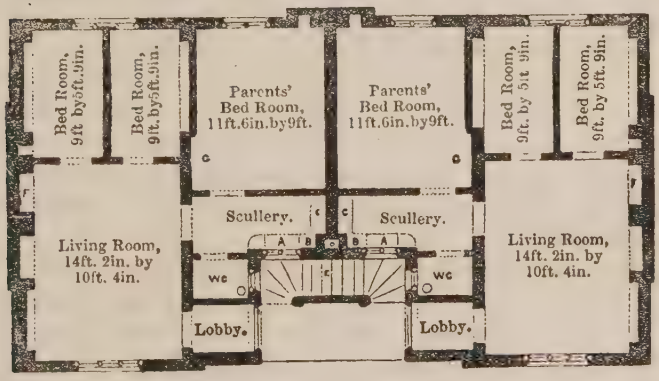
In 1851, His Royal Highness Prince Albert with a desire of conveying practical information calculated to promote the improvement of the dwellings of the working classes, and also of stimulating visitors to the Exhibition, whose position and circumstances could enable them to carry out similar undertakings, caused to be erected at his own expense a model dwelling in Hyde Park (see fig. 1.)

In its general arrangement, the building was adapted for the occupation of four families of the class of manufacturing and mechanical operatives.

Four dwellings are arranged on precisely the same plan on each floor. Each tenement consists of three bed-rooms, living-room, lobby, scullery, water-closet, sink, dust-bin, &c. The model dwellings were visited by thousands, and were afterwards removed to Kennington Common.

As far as I have able to learn, the only person who has practically adopted His Royal Highness' plan, is Mr. W. E. Hilliard of Gray's Inn. It appears this gentleman on inheriting some property in Shadwell, one of the worst districts of the metropolis, found that it consisted of small houses or huts constructed principally of wood, and in a very dilapidated condition. The ground on which they stood was seven or eight feet below the general level of the neighbouring streets, and the houses were tenanted by the lowest class of persons. As might have been expected, epidemic diseases were generally present. Actuated by the most philanthropic views, Mr. Hilliard determined to try what could be done to improve not only his own property, but, by example, the immediate neighbourhood; and his efforts have been crowned with the most signal success. His first steps were to pull down the old tenements, and then to raise the general level of the locality, and thus obtain a proper fall for drainage. On the plot of ground thus prepared, up to the 30th September 1854, he has already erected 80 tenements, according to the annexed plan. All of them were let before they were finished, and the demand continues to be very great. Some of these houses have been occupied nearly three years, and the average population during that period,

FIGURE 1.



A Sink, with Coal Box under.
B Plate Rack over entrance to Dust Shaft, D.
C Meat Safe, ventilated through hollow bricks.
E Staircase of Slate, with Dust Place under.
F Cupboard warmed from back of Fireplace.
G Linen Closet in this recess if required.

Scale of feet. 10 5 0 10 20 30 40 Feet

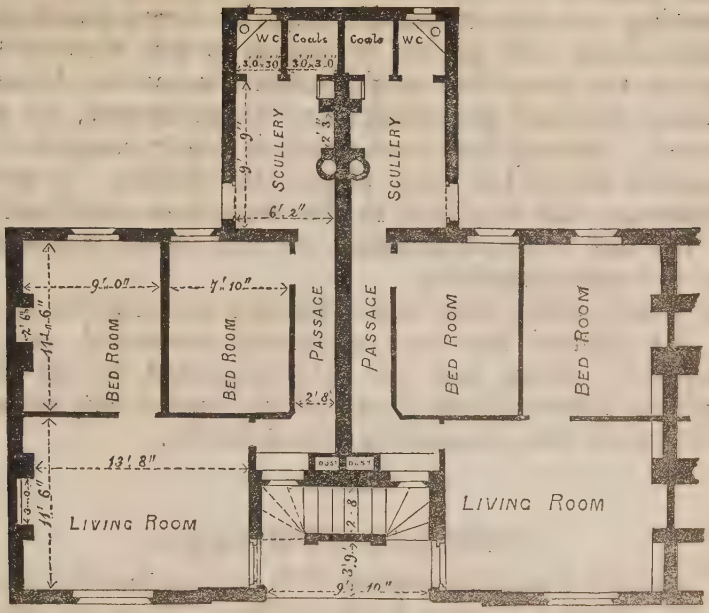
for the whole of the houses tenanted, has been about 450. Among this number of inhabitants congregated in one of the worst localities of the metropolis, a large proportion of them being children, it is gratifying to find that there has been a considerable diminution, if not an almost total absence, of epidemic disease. During the late epidemic, there has not been a single death from cholera or diarrhœa in any of the model houses erected by Mr. Hilliard.

It is also most satisfactory to be enabled to state that whilst this gentleman has done so much to improve the sanitary condition of the dwellings on his property, the money expended has yielded a profitable return. The rents of the tenements vary from 5*s.* to 6*s.* 6*d.* per week; all rates and taxes are paid by the landlord; water supply is on the constant system; a pipe sewer of 12-inch diameter runs in the centre of the street, and each house communicates with it by a 6-inch pipe. The tenants are also amply supplied with fixtures. Mr. Hilliard informs me that the total cost per block of four houses was 487*l.*, and that the gross return on the sum expended has been nearly 7½ per cent., and deducting 1*l.* a dwelling for ground-rent, the property being freehold, there has been a clear profit of upwards of 6 per cent. per annum. So satisfied is he with the results that he is covering some adjoining ground with the same class of houses, with some improvements, as shown in the annexed plan (see Figure 2); and when the work is completed, there will be accommodation for 108 families. The erection of those dwellings has clearly shown the want of proper accommodation for the classes immediately above the lowest class of artisans. Mr. Hilliard states that his tenants, instead of being sweeps, costermongers, &c., as formerly, now consist of a superior class of artisans and mechanics, clerks, tide-waiters, &c., some of whom have removed from considerable distances in order to enjoy the comforts these dwellings afford.

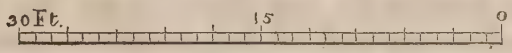
Previous to the erection of these cottages most of these persons were compelled, from the nature of their occupations, to reside in the immediate neighbourhood, where they paid as high rents for accommodation much inferior.

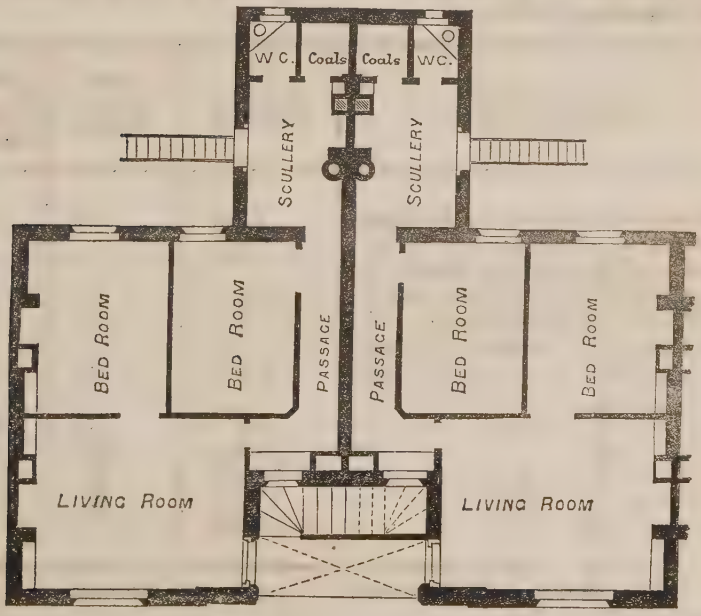
The erection of these Albert Cottages, provided with arrangements essential to health, comfort, and morals, is producing the happiest results in the neighourhood. Tenants have become sensible of the discomforts and evils of their unwholesome dwellings, and will not remain in or take houses without many improvements which formerly they

FIGURE 2.



GROUND PLAN.





ONE-PAIR PLAN.

were content to do without, and landlords are finding it to their interest to improve their old houses, and in constructing new ones to provide superior accommodation and conveniences. On ground belonging to the Mercers' Company in the immediate neighbourhood, numerous houses of a better class and possessing many improvements, are being erected. Already an entire street is nearly completed, and a marked change has taken place in the district. A medical gentleman who has lived in the immediate neighbourhood for the last 30 years informed me that the improvement of late was quite surprising.

I cannot refrain from repeating that the experiment tried by Mr. Hilliard has been eminently successful, and has completely shown that the plan suggested by his Royal Highness Prince Albert, if extensively carried out, is sure to be attended with the most beneficial results.

GENERAL SUMMARY.

From the foregoing reports it is evident that the inmates of the different lodging houses, which belong to either of the two societies for improving the dwellings of the poor, to private individuals, and those under the surveillance the police, have enjoyed all but complete exemption from the epidemic. This, perhaps, will most readily appear from the following table:

Name of Society, Building, or Locality.	Estimated Population.	Deaths from Cholera.	Rate of Mortality in 10,000 living.
Metropolitan Association Buildings	1,455	5	34
Society for improving the condition of the labouring classes	777	1	13
Registered lodging houses under the Metropolitan Police	32,000	26	8
Non-registered lodging houses, but under the surveillance of the police	50,000	35	7
Potteries, Kensington	1,270*	33	259
Bermondsey	50,000	810	162
St. Olave Southwark	20,000	293	146
St. James Westminster	37,000	483	130
Metropolis generally	2,500,000	10,118	44

* This number includes 8 deaths from diarrhœa, and 8 from consecutive fever following cholera.

It is thus shewn that the Metropolitan Association has lost only five of the inmates of the buildings, or in the proportion of 34 in 10,000; but if the four fatal cases which occurred in the Albert Street buildings for families, as having originated from other causes, be excluded, the mortality would only have been in the proportion of 7 in 10,000.

In the society's buildings for improving the condition of the labouring classes, there has been only one death, and that can scarcely be said to have originated in them; and if all the deaths in the buildings of the two societies are taken together, the mortality would only be in the ratio of 26 in 10,000.

Whilst the working of the Common Lodging Houses Acts has been attended with the best possible results, and has far exceeded the anticipation of their promoters, the conclusions to be drawn from these results are seriously affected by the migratory character of the population, and other causes previously stated.

Again, if either the societies' buildings or the common lodging houses are compared with the other portions of the metropolis referred to in the table, or with the metropolis as a whole, it is evident that a very great improvement in the health of the inhabitants of these tenements has been effected. Thus in "the Potteries," Kensington, which still retains its unenviable character for insalubrity, the mortality from cholera and its adjuncts in this place has been at the rate of 259 to 10,000, whilst in all the societies' buildings together it has not been above 27 to 10,000. The mortality, therefore, has been nine times greater in the Potteries than in the model lodging houses.

The facts adduced in the above report appear to me to prove, that in proportion as you improve the dwellings of the people, and secure them proper ventilation, good drainage, sufficient supply of water, and inoffensive water-closet accommodation, you advance the standard of their general health, and exempt them from cholera and other epidemic diseases. The scope of the present report confines me to this class of benefits following from these improvements. More difficult to express in figures, but not less certain, are the still greater benefits which may with confidence be anticipated from rendering homes comfortable and healthy, such as the enhancement of the

domestic affections, the correction of vicious habits, and the opening a way for the admission of the higher and holier influences of religion, to the most numerous and hitherto most neglected classes of the community.

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For Her Majesty's Stationery Office.

GENERAL BOARD OF HEALTH.

COMMUNICATION

FROM THE

GENERAL BOARD OF HEALTH

AND

REPORTS FROM SUPERINTENDING INSPECTORS OF THE BOARD,

MADE TO

THE SECRETARY OF STATE,

IN RELATION TO THE

REPORTS OF THE ENGINEER OF THE METROPOLITAN SEWERS COMMISSION

IN RESPECT TO THE

OPERATION OF PIPE SEWERS.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1855.

LETTER of T. TAYLOR, Esq., Secretary to the Board of Health, to the Hon. HENRY FITZ-ROY, M.P., Home Office.

The General Board of Health,
Whitehall, 27th May 1854.

SIR,

IN transmitting the accompanying Reports, I am to state that, at the time the Board received a request to furnish Lord Palmerston with the names of those towns where they considered that pipe drainage works were in proper operation, they were unaware of the object of the inquiry, nor did they see the answers from those towns, five in number, until they had brought to their notice a printed pamphlet from the Metropolitan Sewers Commission, containing reports and comments by Mr. Bazalgette, the engineer of the Metropolitan Commissioners, on the statements made to his Lordship by Local Boards. Those reports of the engineer contain statements of alleged facts, given apparently on the authority of local officers, so contradictory to the representations of Local Boards themselves, and to those which the General Board had received from other quarters, in relation to the works in question, that they considered it their duty to inquire into the foundation for these counter-allegations.

I am to request that you will submit to Lord Palmerston the accompanying reports, which exhibit the results of this inquiry. One report is from Messrs. Dymond, the surveyors, who executed the works under the Exeter Local Board; another is from Mr. Rammell, the engineer, who designed the pipe sewerage works for Rugby and Sandgate; a third is from Mr. Ranger, the engineer, who designed and superintended the execution of the pipe sewerage works at Barnard Castle; a fourth is from Mr. Pilbrow, the surveyor to the Local Board at Tottenham, a suburb of the metropolis, where combined works of

house and main drainage and water supply have been completed.

There being some allegations by Mr. Bazalgette implying that the last mentioned works had peculiarities which distinguished them from other combined works of town drainage, the Board directed an examination as to those alleged peculiarities. This inquiry was made by Mr. Lee, one of their superintending inspectors, who had nothing whatsoever to do with the works of any of the towns in question, either in planning or in the approval of their plans. Mr. Austin, their chief engineer, being under more urgent engagements, the Board referred to Mr. Lee the whole of the Reports and the several returns, with a request that he would offer any observations on the engineering points contained in them collectively. His report is hereto annexed.

From the several reports, it will appear that charges of serious misrepresentation attach to the engineer to the Metropolitan Commission of Sewers, in relation to the works executed by the Local Boards.

Reports and returns from the engineer to the Metropolitan Commission of Sewers, in relation to pipe sewers in the metropolis, and to the operation of works executed elsewhere, as at Manchester and Leeds, where they were in combination with proper works of house drainage and water supply, and at Croydon, were moved for, and laid before Parliament during last year. These returns contain omissions calculated to mislead the Legislature and the public.

These last-mentioned documents have been industriously circulated, with other statements of the like character, tending to misrepresent the nature of the new works amongst members of Local Boards of Health, who had or were likely to have under consideration combined works of water supply and drainage. In some cases, copies have been furnished to every member of a Local Board. In instances where there has been an opposition to improvement on the ground of expense or from other causes, these misrepresentations have furnished pretexts, either against the execution of any works whatever under the Act, or in justification of much more expensive works than experience has proved to be necessary.

Whilst such misrepresentations on the subject of pipe drainage have tended to obstruct the execution of new works by Local Boards, the General Board feel it their duty to state, that, in the reports of the engineer of the Sewers Commission, the misrepresentations, whether relating to the metropolis, or towns under the Public Health Act, are so couched as to obstruct beneficial improvements in the drainage works required for the relief of the metropolis itself.

As examples of these misrepresentations, it may suffice to refer to the case of the 48 houses in St. Giles', which are cited as models of pipe drainage, while the fact is suppressed that the greater part of these houses were without water, and that there are upwards of twenty thousand houses in the metropolis, the pipe drainage of which, as far as may be inferred from the absence of complaint, works satisfactorily.

While great stress is laid on the stoppages in pipe drains, no notice is taken of the *causes* of these stoppages, nor of the trifling number of such stoppages compared with the extent of the works, which now amount in the metropolis to 347 miles of pipe sewers, draining nearly 27,000 houses.

Another misrepresentation consists in the statement, that, because in some towns under the Public Health Act some of the old sewers have been retained for the surface drainage, therefore the plan of drainage by pipe sewers requires two systems, one for house and the other for surface drainage.

The Board would direct attention to the evidence presented in Manchester of the use of pipe drains in districts of great traffic, for surface drainage only.

Further, by the declaration that pipe sewers require, under all circumstances, greater falls than brick sewers, and the regulation founded on this assumption, that pipe sewers shall be used only when the fall is less than 1 in 200, it is implied that smooth channels and concentrated flows are less adapted to the discharge of matters held in suspension in water than channels which are rough, and in which the flow is diffused; the fact being, that these smoother channels work well when the fall is less than one in 1,000, or nearly a dead flat, and regularly and

uniformly remove the house refuse from the site of a town before it can enter into an advanced stage of decomposition.

The Board solicit Lord Palmerston's particular attention to the evidence, showing the new and decisive results obtained on this point in the several towns where works under the Public Health Act have been completed, and to the coincidence of the results thence obtained with those obtained previously from trial-works in the metropolis.

It is justly observed by Mr. Lee, that the objections of the Board to the works proposed for the metropolis by the Commissioners of Sewers, are founded on principles adopted by two of the most distinguished of those Commissioners, who, as Commissioners for improving the health of towns, reported, in terms of strong condemnation, against the entire principle of such works as are now sought to be applied to the metropolis.

With reference to other misrepresentations, it may be stated that they relate chiefly to matters of physical fact, which, when duly examined, admit of little diversity of opinion; but the exposition of them requires some lengthened explanations, which will be found in Mr. Lee's observations on the reports of the engineer to the Sewers Commission, and on the letter of Mr. Jebb, the Chairman of the Commission, to Lord Palmerston.

The Board submit that the questions raised on these points are of the highest practical importance, both to towns generally, and to the metropolis in particular:—

1st. Whether the sites of towns can be cleared of animal and vegetable refuse before decomposition; it being demonstrated that such decomposition is the chief source of atmospheric impurity, and the chief cause of excessive sickness, and a consequent high rate of mortality.

2nd. Whether this object can be accomplished at such moderate cost as will place the improved works within the reach of town populations generally.

Indubitable facts have answered both these questions in the affirmative. The misrepresentations in question, however, prepare the way, notwithstanding

these facts, for the resumption of works erroneous in principle, inefficient in operation, and enormously expensive.

It appears that an effort is made to create the impression, that the Board entertain little or no objection to the proposed main drainage works for the metropolis, and that their objections relate merely to what are called subordinate works. Without such works, however (of branch and house drainage), main drains are commonly worse than useless. The Board's objection to the proposed main sewers is, that they will cost three millions for an object which may be much better obtained for one million. Their objection to the proposed plan of branch drainage (that is, by sewers in every street so constructed as to accumulate deposit for men to cleanse) is, that it will involve an estimated expenditure of two millions without effecting the desired object; whereas, works on the principles advocated by the Board, self-cleansing, dispensing with cesspools, draining every house of its refuse before decomposition has set in, may be completed for one-third of that amount.

The magnitude of the interests in question, and the extent of the works projected, involving several millions of money, well or ill expended, lead the Board to hope that the statement of facts set forth in the several reports herewith submitted will receive his Lordship's attention.

I have the honour to be, Sir,
Your most obedient servant,
T. Taylor, Secretary.

P.S. I am directed to add that the reports of deputations from Local Boards, appointed to examine into combined works of Sewerage and Water Supply in Towns under the Public Health Act, where such works have been carried out, corroborate the statements made by Local Boards themselves in answer to the inquiries directed by Viscount Palmerston.

List of documents referred to.

1. Mr. Lee's General Report on Returns and Papers.
2. Mr. Rammell's Report on Rugby and Sandgate.
3. Mr. Ranger's Report on Barnard Castle.
4. Mr. Pilbrow's Report on Tottenham.
5. Messrs. Dymond's Report on Saint Thomas, Exeter.
6. Mr. Lee's Report on Tottenham.

Report of William Lee, Esq., Superintending Inspector, to the General Board of Health.

Whitehall, 20th May 1854.

My Lord and Gentlemen,

Observations on pipe drainage.

Your Honourable Board, in consequence of the pressing engagements of Mr. Austin, have been pleased to refer to me, for any observations which I may have to offer thereon, the papers relating to the pipe sewerage, particularly the reports made to the Metropolitan Commission of Sewers by their engineer; the communication of the chairman of the Commission based on these reports; the returns issued under the authority of the Commission; the reports of surveyors and engineers under local boards, and various parliamentary returns.

In presenting to you the following statement, I have to regret its great length, owing to the numerous quotations; but having condensed it as much as I could, I must trust that the importance of the topics considered will secure for it a patient consideration.

Covert opposition of officers of Commission.

Whilst the superintending inspectors were proceeding in the performance of their duties to your Honourable Board, they met in several instances with local opposition caused by printed statements, emanating as was stated from the engineers connected with the Metropolitan Commission of Sewers, and other engineers more directly connected with private waterworks.

At Cardiff, where, as I am informed, plans for new drainage works were under consideration, the opposition led by a member of the local board, who is a builder, was publicly stated to be supported by letters received from one of the old chief clerks of the Metropolitan Commission of Sewers, Mr. Lavers; the result was that a more expensive set of works than your Honourable Board deemed necessary were adopted by the local board. In several places within my own experience the result of such statement was to produce doubt and hesitation, which have ended in an increase of the cost of the works varying from 20 to 50 per cent., without any corresponding increase in their efficiency. One of the printed papers circulated amongst local boards was intituled

" metropolitan experience of the unsuccessful results of *the system* of pipe drainage." This paper professed to give an account of some discussions at meetings of the Metropolitan Commissioners of Sewers upon an alleged failure of pipe drainage works in a place called Church-lane, St. Giles'.

I am informed that, as Major Dawson had been one of the first consolidated Commission of Sewers, and had taken a leading part in its more recent proceedings, he was communicated with by a member of your Honourable Board, who placed in his hands a copy of the paper, circulated (as was understood) at the instance of some private engineers, some of whom were connected with the Commission; and I understand he was remonstrated with on the large misrepresentation implied in the statement, that Church-lane, a group mostly of common lodging-houses, occupied by the lowest order of Irish, was the proper place for the trial of any such work, and in allowing statements to go forth as if these 48 houses were the only houses where pipe sewers had been tried within their own jurisdiction, seeing that, according to their own returns, there had been upwards of twenty thousand houses drained with tubular drain pipes, which their own officers had reported to be working satisfactorily.

Church-lane, St.Giles',treated by Commission not as *exceptional*, nor even as a fair *average* example, but held up as a *model*, of pipe drainage.

Church-lane, St. Giles', filthy and degraded to the lowest degree.

Large majority of successful instances suppressed. Isolated failure magnified.

In explanation it is necessary to submit the following summary from the returns made to Parliament of the length of pipe sewers and drains (public and private), and of houses drained with pipe drains under the sanction of the Metropolitan Commissioners of Sewers since the year 1849 and up to the present year, so far as is shown by their own returns, which are, however, imperfect as relates to the private works during the year 1849, when much had been already done.

In this return the number of failures reported during each year, as shown by their own returns, are included, these being chiefly in sewers.

It will appear that up to this time the total length of pipe sewers and drains laid and now in action is 346 miles.

346 miles of pipe drainage now in action in London alone.

The total number of houses pipe drained appears to be, up to the last return, 26,978, which exceeds in number the houses of the cities of York, Gloucester, Salisbury, and Canterbury, collectively.

About 27,000 houses so drained in London alone.

I submit to the attention of your Honourable Board the fact, that amidst the extent of pipes made, is included upwards of forty-one miles of three and four inch house drains, equal, when properly applied, to the drainage of about ten thousand houses; and that, whilst the use of tubes of this size by the Commissioners was discontinued, the use of the same sizes by private individuals was increased.

Upwards of 41 miles of drains of three and four inches in diameter are in action within the jurisdiction of the Metropolitan Commission of Sewers.

TOTAL LENGTH of PIPE SEWERS and DRAINS, Public and Private, executed in the METROPOLIS according to the Returns of the Metropolitan Commissioners of Sewers from 1849 to 1853, both inclusive.

Years.	At the expense of the Ratepayers.	By Private Individuals at their own expense.	Total.	Of which there were laid down Drains of three and four inch diameter.			Total No. o Houses drained.	Total of reported Failures of Pipe Sewers and Drains.			
				At the expense of the Ratepayers.	By Private Individuals at their own expense.	Total.		Stoppages.	Pipes broken.	Pipes relaid.	Brick Sewers substituted
	Miles. Feet.	Miles. Feet.	Miles. Feet.	Feet.	Feet. Miles. Feet.	Feet. Miles. Feet.					
*1849	8 4,062		8 4,062	1,214	- - -	1,214	- -	20	-	6	-
1850	16 607	45 2,141	61 2,748	2,859	36,499 = 6 4,819	39,358 = 7 2,398	4,926	59	4	8	-
1851	23 1,417	82 1,413	105 2,830	1,668	67,198 = 12 3,838	68,866 = 13 226	8,581	77	3	8	3
1852	9 3,734	68 3,461	78 1,915	817	52,425 = 9 4,905	53,242 = 10 442	6,271	77	16	22	9
1853	6 4,945	85 599	92 264		56,955 = 10 4,155	56,955 = 10 4,155	7,200	5	9		2
Total	64 4,205	281 2,334	346 1,259	Mile. Feet. 6,558 = 1 1,278	213,077 = 40 1,877	219,635 = 41 3,155	26,978	238	32	50	14

* It is stated that no accounts were kept of the works laid down by private individuals in 1849.

The extent of the failures numbered is not stated in the returns, nor are any means afforded of collecting it from the expenses of reparation, which are only given in a few instances. The expenses of the pipe sewers are mixed up with those of the brick sewers executed under the Commission, so as to prevent them being distinguished. But from the amounts given, the whole of them put together are trivial as compared with the extent of the works; and, considering how badly much of the work was known to have been superintended, the expenses stated form probably only a small per centage of the total expenses incurred. From what is known of the common execution of the new house drainage works when they were required by private individuals, it is highly probable that failures in those private works were much more numerous than stated. In respect, however, to the case circulated of the defective works in St. Giles'; looking at the returns of some twenty thousand houses, and the increasing demands for the smallest sized pipes by private individuals, the presumption raised on the statement of the occurrence there of any stoppages is, that there must have been some gross defect in the construction and management of the works, to have occasioned so large a proportion of failures amongst so very small a proportion of the aggregate number of houses drained. I am informed that Major Dawson promised that he would promote measures by which, when the works where stoppages had taken place were opened, some engineer of your Honourable Board might be present to see the real nature of the alleged failure, but that nothing of any such proceedings has been heard of.

The returns do not state the extent of failures.

The expense of failures proved by the returns of the Commission to have been trivial.

Returns showing a large disproportion of failures *in one instance*, as compared with the aggregate, imply mismanagement in that instance.

As the place had been a conspicuous seat of fever, it was visited by one of the Board's medical inspectors, Dr. Sutherland. Mr. Austin, one of the engineering inspectors, also obtained some information respecting it. The particulars of his description of the place show what kind of facts have been made to serve as a superstructure to the general statement promulgated against the new works; and referred to publicly by Mr. Stephenson, the chief consulting engineer to the Commissioners of Sewers. Mr. Page, in connexion with the Croydon inquiry, having also noticed this case, says,—

Church-lane, St. Giles', examined by Dr. Sutherland and Mr. Austin.

Proof that Church-lane, St. Giles', has been improperly held up as a model of pipe drainage.

"It is important to notice in detail the account given of the "working of this specimen of pipe drainage, because it was "introduced, executed, and changed by a body deeply in- "terested in the attainment of the best system of sewerage. "Every attention was given by the engineers to its arrange- "ment and execution, both of which, on the principle of "adopting back drainage, and pipes for main sewers, were "apparently perfect, while the inclinations of the pipes were "favourable, the supervision faultless, and the supply of "water for flushing abundant."

Mr. Austin, in his report, replies to this,—"I have great "reason to doubt whether every attention *was* given to the

Impropriety of treating this as even a fair

example of pipe drainage.

" execution of this work, or whether the supervision was " faultless; we have, at least, the fact admitted, and when " the work was pulled up, it was found irregular both in " plan and section, and that the inclinations, which were to " have varied from 1 in 44 to 1 in 70, were found to vary " from 1 in 62 to 1 in 200. All this is unimportant, however; " for if the sewers had been laid in the most perfect manner, " they must have failed for want of the only thing that could " possibly have kept them in action, namely, an adequate and " uniform supply of water. There was abundance of water, " Mr. Page says; truly there was, in the tank; but the " water-closets, 43 in number, were all fitted with an appa- " ratus that was so soon out of order, that, when examined " by Dr. Sutherland, only 10 out of 38 or 40 were found " in operation. In the remaining 28 or 30 the water was " stopped. It would be about as just and reasonable to con- " demn a locomotive, because it would not work when the " fire went out for want of fuel that was in the coke store, " as to call this case a failure of pipe drainage fairly working. " But besides the want of water, the commonest precautions " which the nature of the locality demanded appear to have " been wholly neglected. This spot is the vilest that can be " conceived, unparalleled even in London, the resort of the " most depraved and filthy class of the community."

Proof of the utter degradation of Church-lane, St. Giles'.

Dr. Sutherland states,—" It is common to find 50 people " in one of these courts, or even 40, in a single house. The " houses are dark and filthy to an incredible degree, and the " people, in many instances, as filthy as the houses. There " are a number of persons who make a living by hawking " vegetables and fruit, and a large amount of refuse is con- " stantly being accumulated, which the active cleansing can " scarcely remove fast enough; some of the courts are badly " flagged and filthy, and many of the dust-boxes were full " of house refuse." He continues,—" The doors of many of " the houses, in which I saw quantities of vegetable refuse " accumulated on the floor, are close to the water-closets, " which have no doubt been sometimes made places of deposit " for the refuse, to save the trouble of carrying it along the " court into the street, for in several cases there are no dust- " bins. Seeing what I have of the uniform and complete " success of the water-closet apparatus, and other sanitary " improvements among the lowest classes and in all kinds of " places, I believe it would be a libel, even on the depraved " inhabitants of St. Giles', with all their wretched habits, to " say that they would not have kept these places in tolerable " order, if the most ordinary care, instruction, and super- " vision had been bestowed upon them."

To quote again from Dr. Sutherland's report,—" The " people had never been warned as to the use of the closets. " There was even some rude attempt at scratching directions " on the doors by the people themselves; and I cannot help

" thinking that a simple handbill posted behind each door " would have led to a more careful use of these conveniences."

He adds,—" Some of the tenants in Church-lane had even " offered to contribute to the expense of this superintendence, " which was, moreover, recommended in the original report, " but apparently not properly carried out."

This report was dated in October 1852. In the following January the surveyor of the Metropolitan Sewers Commission says,—"This locality has always had, and will always " require, the attention of one person to look after the water-" closets, and other apparatus within reach of the inhabitants."

The value of the superintendence the locality had, before the pipe sewers were taken up, may be inferred from the fact that nearly three-fourths of the whole number of water-closets had been allowed so to get out of repair, that no water at all was supplied to them, and especially from rude attempts at scratching directions on the doors by the people themselves.

It appears, therefore, that the most exceptional and unparalleled case that could be found in the metropolis, is adduced as a proper example of the working of pipe drainage; and that the principle is condemned by the engineer to the Commission, because evils had arisen from the want of that superintendence by the Commission, which their officer considers to have been necessary.

Proof that, in the most degraded localities in the metropolis, pipe drainage is fully successful with proper superintendence.

One of the officers of the Commission had given a previous instance where the new house drainage works had been laid down with imperfect supplies of water in houses of the poorest population. From the tenor of this evidence, attesting the improvement amongst those, notwithstanding the unfavourable conditions, he was asked,—" Even supposing there " was no improvement in the population themselves, nor in " their habits, judging from the practical experience now " obtained, would the occasional stoppages and obstructions " resulting from carelessness or wilfulness countervail the " advantages of the system?" He replies,—" Certainly not. " It has been applied to houses in Bromley St. Leonard's. " The inhabitants were poor Irish people, and had not been " prepared by their habits for such improvements, but the plan " answers, although the supply of water is very ill applied."

In Church-lane, St. Giles', the water supply should have been improved, and the superintendence stated by the engineer to have been necessary added, instead of the drainage being condemned.

The proper course with the stoppages at St. Giles' would have been to have remedied the defects of the water supply by which they had been obviously occasioned, and to have provided the care originally recommended as necessary; but with the experience then obtained, the substitution of brick sewers at an additional expense of 760*l.* for the main drainage of not more than 48 houses, when impartially and competently examined, will be found to have been a wasteful expenditure of public money.

General Board on defective

Previously to any of the returns being made by the Commissioners of Sewers to Parliament, your Honourable

manufacture of pipes, &c.

Board had in your Minutes of Information on Town Drainage, issued for the use of the local boards, made the following statement:—

"The manufacture of sewer and drain pipes being of very "recent date, and having been undertaken by persons using "most imperfect means and possessed of little capital, pipes "have been made of clays and marls unfitted for the purpose, "badly tempered, worse formed, and imperfectly burned. "Such pipes when taken from the kiln have been rough on "the surface, porous and absorbent in substance, and untrue "in section to such an extent that two pipes of 12 inches "diameter, placed with their ends together in work, show "an unevenness of joint to the extent of an inch or more; "then as to the character of joint, there have been made butt "joint, socket, half socket, and rabbet, several varieties of "each; some of the sockets have been imperfectly joined to "the pipe, and many of the pipes have been so imperfect in "sectional form that the plain end of a pipe could not be "inserted in a socket. Such pipes have been laid in very "large quantities throughout the country, and without any skill "or judgment. Pipes nine inches in diameter have been "joined on to others of six or four inches; and not unfre- "quently, a pipe sewer or pipe drain has been divided or "continued by means of a sewer or drain of larger dimensions, "square on section, and formed with bricks set dry or with "dry rubble. During the recent prevalence of cholera in "1849, every tile pipe maker's yard was cleared out, and "even pipes which had been thrown by as refuse, by persons "not over scrupulous, eagerly purchased and were hastily "laid by parties utterly ignorant of any rule of correct "drainage. The causes of failure from mere ignorance "and want of skill have been sufficiently numerous, but it "has been found that to these have been added others "arising from the hostility of interests, in the more expensive "forms of works, and from prejudice against alteration; that "many pipe drains have been so laid as to create obstructions, "and these failures, though the causes were obvious and gross, "yet have been eagerly held forth as proofs of the failure of "the principle. Experience has generally been most "unfavourable to employing, for the execution of new works, "men habituated in the practice of old works which it is "necessary to supersede. Though the demonstrations of the "errors of former works were admitted at every step by such "men, and although they have themselves proffered illustra- "tions of such errors, yet no sooner were any authoritative "directions of new works withdrawn than the old practices "were immediately reverted to."

Commissioners' return as to failures of pipe sewers in the metropolis.

Amongst the papers which have been presented to Parliament from the Metropolitan Commissioners of Sewers is "a return of the pipe sewers and drains (public and private) "laid down within the jurisdiction of the Commission

" since 1848, which have wholly or partially failed in conse-
" quence of breakage and obstruction, so far as it can at
" present be ascertained." With this return is given cross sections of pipes, which were found wholly or partially filled with deposit; and a report by the Commissioners' engineer, Mr. Bazalgette, in which he states, " Out of the 122 pipe
" sewers which I have examined, I find 66 containing $2\frac{1}{2}$ ins.
" or upwards of deposit, some entirely choked, 23 cracked
" or broken pipes, 47 containing less than $2\frac{1}{2}$ inches of
" deposit."

No explanation of the infinitely small proportion of failures to the extent of pipe sewers.

These returns of the failures of pipe sewers are given without any explanation as to the proportions of those failures to the whole of the pipe sewers executed, connected with house drains and supplied with water. The impression which the return is calculated to create is, that the return of sewers examined was a return of all that had been laid down, and that all had been laid down under proper conditions.

Negation by the Commission of the 346 miles of pipe drains in London, and presumption by them that when failures occurred in Church-lane, St. Giles', it became necessary to seek in provincial towns experience of the working of pipes for drainage.

Afurther presumption raised by the Commissioners' returns in relation to the house drainage works in St. Giles' is (in the absence of any explanations), that the sewers there were so unsatisfactory that it had become necessary for the Commissioners to seek for the results of experience elsewhere, and, amongst other places, in such towns as Leeds and Manchester; where, although the pipe drains are reported to have served their purpose, they were unconnected with house drains, and had no such application of water as contemplated.

Assiduity with which reports of failures have been disseminated in towns under Public Health Act.

Copies of the returns of these alleged failures of sewers, and the diagrams of the pipes filled with deposit, were also circulated in the towns which had adopted or were considering the adoption of the Public Health Act. To my own knowledge of many local boards, every member was gratuitously and anonymously furnished with a copy. At the publishing price it must have cost the senders a large sum of money to do this. Mr. Austin states to your Honourable Board: " At a recent public meeting at Wey-
" mouth, an opponent to the Public Health Act asked me,
" 'What guarantee can the General Board offer us at Wey-
" mouth against such fatal consequences as these,' (flourishing
" the diagrams of stopped pipes published by the Metropolitan
" Commissioners of Sewers,) 'if we adopt pipe drainage; and
" what course would they advise?' I could only reply, that
" the guarantee would be in the hands of the local board,
" and would consist in taking care that the work was care-
" fully and efficiently executed, in adapting it to the required
" purposes, in ascertaining that it was made complete in all
" its parts and properly protected, and in securing an adequate
" supply of water; that this was the advice which the General
" Board would give; and that the inhabitants of Weymouth
" might then rest assured that they would be free from the
" consequences which they dreaded."

Proof by the returns of the Commissioners of the very small proportion, either in extent or cost, of failures to the whole of the pipe sewers.

Within the period to which the return relates, and up to the end of the year 1852, the total extent of public and private pipe sewers and drains laid down in the metropolis (according to their own return) appears to have been 241 miles; and there is reason to believe that in suburban districts much has been laid down which is not comprised in the returns.

The number of the cases of alleged failures of pipe sewers, as in the case of the 48 houses treated and put forward as "the metropolitan experience of the unsuccessful results of "the system of pipe drainage," was put forward without any information of the extent then executed and in action. Such of the expenses as are stated to have been incurred (whether rightly, or wrongly as is manifest in one instance) were under three thousand pounds during four years, which sum, for ought that appears, is only a small per centage of the original cost of the works. No reference is made to the cost of opening and repairing old works. Now from a house-to-house inquiry made in six average parishes comprising 8,000 houses, it appears that the cost of cleansing and repairing the permeable brick house drains varied from 4*l.* to 13*s.* per house, being on the average 19*s.* 8*d.* or nearly 1*l.* per annum per house; whilst if the expense of the brick sewers was charged upon each house according to the frontage, and at the average expense of about 29*l.* per annum per mile, it would amount to 6*s.* or 8*s.* per house, in addition to the expense of cleansing the brick house drain.

Large cost of cleansing, removing deposit, and repairing brick sewers and drains.

On the improbable assumption that pipe sewers would require to be relaid in some cases; they would still be more economical than brick sewers.

The cost of cleansing and repairing the permeable brick drains of upwards of twenty thousand houses, and upwards of two hundred miles of brick sewers of the old construction, would probably not be less than thirty or forty thousand pounds per annum; and, even supposing the defaults to be unavoidable, the economy would suffice for relaying the whole of the pipe sewers in five or six years. In presenting as some new charge the cost of re-constructing either tubular sewers or tubular house drains, even if the casualties had been much greater, and in keeping back the comparative rates of charge for the works which they superseded, an impression is created, calculated to deceive the public and the Legislature.

The above assumes for argument, that the occurrence of a proportion of such stoppages and failures was absolutely inevitable under due conditions and appliances.

The return of the Commission does not explain the causes of stoppages in pipe drains.

The return in question of the number of stoppages of pipe sewers and drains, is given without explanations of the causes, leaving it to be implied that they occurred under fair conditions.

Causes of stoppages not attributable to the principle of drainage, but to preventible circumstances.

It is, however, known that many of the outlets to the pipe sewers, where the stoppages occurred, are tide locked; and that, during the stagnation of the sewage, deposit must take place in the pipes, and that they must be stopped eventually, however large. Many of the brick sewers so rapidly accumulate deposit, that it gets above the pipes which dis-

charge into them, and so stops up the pipes. In many cases there is scarcely any water supply for the working of the pipes.

Yet of pipes so stopped, cross sections are given of the amount of deposit in them; and the explanation of the causes being omitted, the impression conveyed is, that the pipes (many of which there is good reason to believe have been otherwise stopped wilfully) were free from any but internal causes of stoppage.

Unfairness of giving such instances of stoppage without explanation of causes.

There is in other respects strong ground for questioning the truth of this return, as the examination of the pipes was stated to have been made at night, under the guidance of the contractors (who conceive they lose money by the cheaper apparatus), and in the absence of the surveyors who laid down the works.

The surveyors might have explained the conditions under which the stoppages took place; but it is stated that they have been prevented from giving any information whatever upon the subject.

One of them told me, in answer to some inquiry, that they were forbidden by the Commissioners to give any information as to the working of pipe drainage in London.

In passing I cannot avoid the remark that, while the officers of the Commission, who have had large experience of pipe drainage, are under such a prohibition, Mr. Bazalgette alone, holding different views, appears to have full licence, not merely to express his views as to London, but any other place.

Amongst other items in this list there is the following, "Parliament-street, pipe-gulley drains (stopped and failed). Re-constructed at a cost of 179*l.* 14*s.* 8*d.*" Persons in passing through Parliament-street may often have seen it flooded, and works in progress, with pipes taken up and replaced. Now it was a subject of observation amongst my colleagues and myself, at the time these pipes as well as the works beneath were laid down, that they were so laid as to occasion stoppages.

Parliament-street quoted by the Metropolitan Commissioners of Sewers as an instance of the failure of pipe drainage.

The result has proved that they were so laid. Will it be said that they were so laid contrary to instructions, for preventing the entrance of road detritus so as to make them stop?

Similar omissions of precautions clearly needed, and against express instructions for the prevention of the admission of road detritus into pipe sewers without sufficient water, are made the foundation of an hypothesis, that smooth channels or pipes are unsuited for the reception of the surface drainage of the streets, or of storm water.

With sufficient water, pipe sewers are proper for surface drainage.

The self-cleansing power of a proper concentration of the flow of all ordinary house drainage through tubes or channels of the proper size, form, and inclination is now, however, so completely established, as, apart from any explanation whatever in relation to the failures returned, to rebut the conclusions which they have been used to sustain.

There is clearly less tendency to deposit in pipe sewers than in brick sewers.

The Metropolitan Commission of Sewers have adopted, as a rule, that pipe-sewers shall be laid down at inclinations "of not less than 1 in 200 feet." The impression created by the enunciation of this rule is, that there is greater tendency in pipe-sewers to create deposit and to stop up than in brick-sewers. Their engineer has recently distinctly stated, in respect to pipe-sewers, that "they require, under all circumstances, comparatively steep falls!!" This rule may be challenged upon a question of fact, as displaying fundamental error, upon which is based the whole system of sewers of deposit requiring men to cleanse them.

In illustration of the physical facts to which the rule of the Commissioners and that of their acting engineer stands opposed, the following statements may be submitted as deserving of attention.

The Metropolitan Sanitary Commissioners state, in their first report, that Mr. Roe, "at our suggestion, made experiments in the rate of flow of water through the common brick drains for houses, as compared with the rate of discharge through earthenware drains of the same capacity, and with the same run of water. The general results which he gives are, that through the earthenware tubes the rates of discharge are increased to an important extent;—in the smaller and more frequent forms to the extent of more than one-third. In other words, an economy of one-third the quantity of water to obtain the same result is effected by them, and the general efficiency of the drainage in ordinary runs proportionately augmented, as will appear, at a greatly reduced price."

The following are examples:—

TABLE of Comparative Time of Run of Water through Brick Drains and Glazed Pipes.

Inclination.	Depth of Water.	Time through Glazed Pipes.	Time through Brick Drains.
Level - - - -	5	38	50
2 inches in 50 feet -	$4\frac{1}{2}$	$16\frac{1}{2}$	25
$1\frac{3}{4}$ ditto - -	$5\frac{1}{2}$	19	27
$2\frac{1}{4}$ ditto - -	3	18	26
$1\frac{1}{2}$ ditto - -	$3\frac{1}{2}$	25	36
$3\frac{1}{4}$ ditto - -	4	15	22
$2\frac{3}{4}$ ditto - -	6	$13\frac{1}{2}$	$21\frac{1}{2}$

The same engineer also conducted other trials, in which he showed that, by making the sides of a brick sewer smooth (like the sides of an earthenware pipe) by means of cement, a difference was made of the prevention of any deposit with the same size, inclinations, and run of water, that in a common

sewer occasioned deposit. Such facts as these were before the Commissioners, and were demonstrative that the smoother channels, instead of needing more fall, required less fall under all circumstances.

The following reasons for the difference of flow between pipe and brick channels will be very apparent:—

"In the trial works with smaller sized drains, it was found that stoppages generally commenced by the detention of large or small substances at the joints; and therefore, the less numerous and more perfect the joints, the less probability of such obstructions. Pipes, as generally made, present one joint only at every length of two or three feet; but a yard length of 15-inch drain, constructed of 76 bricks, has 69 feet of joints, and a yard length of 18-inch drain has 92 bricks and 83 feet of joints. The joinings between bricks, besides being so much more numerous, are much less perfect than those of well-made pipes, and yet it is important that those should be made as perfect as possible."—*Vide* "Minutes of Instruction on House Drainage."

Superior scouring action of pipes demonstrated by experiments of the Metropolitan Commissioners of Sewers.

The results between a system of sewerage which was perfectly self-cleansing, and one in which foul deposits were accumulated, were so highly important in a sanitary point of view, that further trial works were directed.

One was of a line of sewer where the observations were very carefully made.

"In this sewer, which had a flat segmental bottom three feet wide, a sectional area of 15 feet, and an average fall of one in 118, the deposit from 1,200 houses regularly accumulated at the rate of 6,000 cubic feet per month."

But a pipe of 15 inches diameter placed along the bottom of the same sewer, with a somewhat less inclination (1 in 153), kept it perfectly clear of deposit. The average flow, without rain fall, was about 51 gallons per house per diem; the absolute drainage, apart from rain-water, from all the 1,200 houses would have passed through a five-inch tube (of the relative size of the smaller one shown within the 15-inch tubular pipe, placed along the bottom of the brick sewer), or not one-third the area of the minimum sized drain which had, up to the time of the investigation, been declared and enacted in the Metropolitan Building Act to be necessary for a single house, namely, one of not less than nine inches diameter.

This must be taken as the enunciation of an actual fact respecting the house drainage alone of 1,200 houses. In practice your Honourable Board has urged the necessity of sufficient provision for ordinary rain falls, and would recommend no pipe from a single house of less than 4 inches diameter.

Another example of the same fact.

In another example, a pipe was laid down in a sewer of deposit, in respect of which it was reported,—"The velocity "of the stream in the pipe has been observed to be four and "a half times greater than the velocity of the same amount

" of water on the bed of the old sewer. The pipe has not " been found to contain any deposit, but during heavy rains " stones have been distinctly heard rattling through it." " The force of the water issuing from the end of the pipe is " sufficiently great to keep the bottom of the old sewer per- " fectly clean for 12 feet in length ; beyond this distance a " few bricks and stones are deposited, which increase in " quantity as the distance from the pipe increases. Beyond " a certain distance mud, sand, and other deposits occur, to " the depth of several inches, so that the stream there is wide " and comparatively sluggish, and, being dammed back by " the deposit, exerts an unfavourable influence on the flow of " water through the pipe. On the invert of the original " sewer, which now forms the bed of the pipe, deposit was " constantly accumulating, and was only partially kept under " by repeated flushings. The superficial velocity of the " water in the pipe is generally three, four, and five times " greater than the superficial velocity which obtained, *under* " *the same circumstances,* in the original sewer ; and the " velocity of the *whole mass of water* in the pipe approxi- " mates much more to its surface velocity, as ascertained by " a float, than does the velocity of the *whole mass* of water " in the sewer approximate to its own surface velocity."

The main facts established by these two trial works, if they had stood alone, were demonstrative of the error of the whole system of sewers of deposit, and expensive works previously in the course of construction, and which are still proposed to be maintained and extended in the metropolis.

Remedy for the evils of recently constructed brick sewers.

The remedy for the new Victoria sewer, and for a number of other new brick sewers, which have been recently constructed, and which are now stated to contain foul stagnant deposits, would be to adopt similar means to those displayed in the above instances, and to concentrate the flow of water for their constant clearance. The great object of the immediate removal of all refuse by a better adjustment of the channels of conveyance, was of such immense importance for the purification of the atmosphere of the metropolis and towns, as to render the greatest accuracy and extended trials most desirable. With this view a special committee of men conversant with physical science, was appointed as a trial works committee, to revise and correct the results obtained. They appear to have done so as far as the flow of pipes up to 6 inches diameter. At that point the first consolidated Commission of Sewers was superseded ; but the committee left a recommendation to their successors, who were chiefly engineers (and to whom exact information on the flow of water under such circumstances should have been a matter of professional interest), that the trials should be continued for the larger sizes ; but instead of being continued, it does not appear that one engineer paid a visit to the works ; the stages constructed for conducting them were pulled down ; the pipe

Importance of investigations as to the best means of *removing* instead of *retaining* the refuse of town sewers.

The succeeding Commissioners did not proceed with so important an investigation.

sewers in the instances cited, which, as they prevented deposit, it might have been expected would be allowed to remain for the benefit of the inhabitants, were plucked up; and, I am informed, the deposit has accumulated, as before, in the old sewers, and all traces of the results previously obtained have been, as far as practicable, obliterated. Fortunately, however, for the public, enough of information and instances had been secured to save the improvements. Moreover, Mr. Roe, who has the character of being a highly conscientious officer, had made a long series of observations on the outflows of storm water from the main sewers in the trunk and valley lines of the metropolis, as he had previously done upon requests made to him in respect to the smaller branches. These results he has tabulated, and placed in the hands of the Board, and they have been circulated in the Minutes of Instruction for the guidance of the local boards.

Sufficient, however, had been done to establish, that the proper principle of town drainage was by "sewers of discharge."

The rule cited, that pipe sewers require, under all circumstances, comparatively (*i. e.* to brick) "steep falls," involves the proposition that the flow of water is quicker in channels which are comparatively rough, than in those which are smooth; in channels which have many joints and means of obstruction, than in those which have few; in channels in which the flow is concentrated, than in those in which it is spread and diffused.

Inferences involved in the rule of the engineer to the Commissioners as to the requisite fall of pipe sewers.

This deliberate rule will, upon a competent and impartial examination, be found decisive as to the extent of the views of those by whom it was maintained and passed.

It is a matter, not of opinion, but of fact, that so far from pipe sewers requiring greater falls, a proper examination of the working of those within the metropolitan districts will show, as in the instances cited, that they require much less. Indeed, it is these qualities of the smoother channels and the concentrated flow that render them available, in many instances, for the relief of districts with outfalls along nearly dead flats. The omission, by the engineer of the Sewers Commissioners, to notice the instances of extraordinary service rendered by pipe sewers in other places, can only be treated as an aggravation of the misrepresentation implied in the omissions to notice the experience adverse to his rule in the metropolis itself.

The portion of the sewage of towns drained from sewers of deposit and arriving at the outfall is only distinguishable by the foul smell of decomposition from common muddy or putrid water of rather a dark colour; such sewage usually being, in fact, not the matter in the form in which it is sent into the drains, but the results of its disintegration in advanced stages of decomposition underneath the houses or in the sewers under the immediate site.

Distinction between the state of the sewage, and the consequent effluvium, in sewers of deposit and in sewers of discharge; in the former, putrid; in the latter, scarcely changed.

But the outfalls from the new works present very different appearances and contrasts, in the almost entire absence of the odour of decomposition.

The chief last points of examination, on the completion of the improved works of towns, are to visit the cottages, the former seats of fever, and ascertain whether the cesspool has been removed, and whether there is any cesspool smell as if from decomposing deposit from the house drains or closets; and then to examine the outfall from the town, to ascertain whether the whole system of drainage presents the appearances of the complete discharge of all refuse.

Experience of discharge from pipe sewers with one-fifth of the inclination limited by the Commissioners.

St. Thomas's, Exeter.

Mr. Dymond, the surveyor to the local board of St. Thomas's, Exeter, thus describes the action of the pipe sewers of that district, and of the outfall from them:—

"Persons of long practical experience in the construction "of sewers under the old systems gravely doubted the suffi- "ciency of such inclinations as these, to afford a flow of sewage; "but many have been, and all may be, satisfied by ocular "demonstration that their fears were groundless, as applied to "carefully-laid stoneware pipes. With a fall of only 1 in "1,000 the main sewer has been kept perfectly free from "deposit, and the flow has been at the average rate of $1\frac{1}{2}$ feet "per second." The average depth of flow in this 18-inch pipe (a size for about 700 houses, one-third of that which the Sewer Commissioners have ordered for nine houses in St. Giles') was about three inches and a half or four inches; at times there was about an inch or an inch and a half of deposit, but always covered, and cleared away by the first shower of rain. Dr. Waller Lewis and others testify to the important fact that, although the matter discharged was little altered in appearance, the outfall was entirely free from the odour of decomposition, and had scarcely a perceptible odour, decidedly less than from one open cesspool to a single cottage dwelling. "It is questionable," observed Mr. Dymond, "whether any "form of brick or stone sewer would have been kept clear "under such circumstances; and there can be no doubt that "those adapted for the admission of workmen would have "been in fact no sewers at all, but a mere cesspool, more "than a mile long, occupying the whole length of the three "main streets, and requiring the frequent resort to expensive "manual labour for the removal of its contents."

"Instead of storing the sewage matter in close neigh- "bourhood to the houses in numerous scattered cesspools, "often entirely open, and seldom properly secured from "leakage—this matter is by the new system carried off "direct to a single covered reservoir, beyond the populated "district, where it is at least harmless. The local board "will soon have abolished the large area of putrid evaporat- "ing surface exposed in the form of open cesspools to the "influence of the sun and the free action of the wind in the "midst of human habitations. So readily does the smooth "interior surface of the glazed stoneware pipes allow the "passage of the sewage, and so securely do these pipes retain "the flush of cold water that drives it from the houses, that

" no time is afforded for the process of decomposition, and " the foul gases scarcely begin to evolve before the deposit " in the house drains reaches its destination at the terminus " of the main sewer." The engineer to the Metropolitan Commission of Sewers notices the condition of the catchpit and the outfall of the sewer; he had therefore the ocular demonstration of its working before him (as also in the outfall from the pipe sewer at Croydon, of the like extraordinary inclination of less than one inch in 1,000, in the matter being as completely discharged). Croydon.

The removal of the house drainage from 1,600 houses, as well as much subsoil or land-spring drainage from the site of Tottenham, is effected by a pipe of nine inches diameter at its commencement, afterwards increasing to 12, and gradually to 18 inches at the outlet. Tottenham.

Your Honourable Board will perhaps permit me to quote from my recent report on the condition of the works in that town, as considered in the report of the engineer to the Commissioners.

" Mr. Pilbrow," the local surveyor, " states that he has " never known the stream of sewage rise quite to half the " height of the sewer." " At the time of my examination " during rain it was $5\frac{3}{4}$ inches deep at about half a mile from " the outlet; and at the outlet, owing to the increased " velocity, it was only $2\frac{3}{4}$ inches deep. With an inclina- " tion of 1 in 1,062 the stream was capable of discharging " stones or brick bats of considerable size. The velocity " there is about $2\frac{1}{2}$ miles per hour, so that within the space " of about 60 minutes all excrementitious or other offensive " matter from the most remote part of the town will be dis- " charged at the outfall at a considerable distance from any " habitation. The matters are quite unchanged, and there " is scarcely a perceptible odour at the mouth of the sewer. " In all my official experience under your Honourable Board " during the last six years, I cannot say that I have found " less odour from one single open privy than from this new " outfall sewer from 1,600 houses." Such results, it need scarcely be pointed out, are coincident with the results of the trial works obtained in the metropolis, and which upon a competent and impartial consideration might have been as confidently applied to the relief of its inhabitants as they have been to the provincial towns under the Public Health Act.

Other reports testify to the achievement by the new means of the discharge of refuse from beneath the site of a town before it can have time to enter into any advanced state of decomposition. The smells that assail the passengers from the openings of the metropolitan sewers, such as from the new sewer in Parliament-street, are the result of the decomposition of refuse detained for days and weeks. The following is another instance of the working of the new system of

Sewers of discharge do not afford time for the decomposition of the dead refuse of the towns, and therefore stench is comparatively avoided.

Rugby.

sewers at Rugby, where the sewers receive the surface drainage. The main sewer consists of more than six miles of tubular piping; at its commencement it is six inches in diameter; it presently increases to nine inches, gradually widening to 20 inches, which is its diameter at the outlet. The velocity in the pipes is rapid, viz., at least two and a half miles an hour, the contents being discharged at the outlet almost as they are received without any signs of decomposition. The average depth of flow in the main is about four inches, not varying much day or night. Whilst such demonstrations at the outfalls, manifest to the senses, are utterly disregarded, the evidence of the more important effects produced in the houses drained is suppressed. The following is an example of the evidence rendered and passed over at the Croydon inquiry:—

Unpalateable facts are suppressed.

Mr. Demsday, a lay visitor of the poor at Croydon, stated:—"As the lay assistant of this parish for more than four "years, visiting the cottages of the poor, 70 in number "weekly upon an average, before the operations of the "Board of Health and since, I think it my duty to declare "this fact, that there is an immense improvement in these "cottages from one end of the town to the other since the "operations of the Board of Health. I suffered much from "entering some of the cottages before the works were com-"menced in different parts of the town, now I can enter the "same houses with comfort."

Bad smells prove bad sanitary works, and indicate causes of disease.

It has become an axiom, verified by all the experience of the officers of your Honourable Board, that in towns all offensive smells from the decomposition of animal and vegetable matter indicate the generation and presence of the causes of insalubrity and of preventible disease, at the same time that they prove defective local administration, *i.e.*, of such works. This is as applicable to the metropolis, where the powers provided by the legislature are misapplied, as elsewhere.

When such a result as that above described by the lay visitor is obtained, similar results from the use of similar means may be expected with perfect certainty; the reduction of low headaches, relief from the frequency of indescribable feelings of depression, improved digestion, and more spirit and energy for labour on the part of the adult inmates, a diminution of the amount of positive disease, and a proportionate immunity from the attacks of epidemics.

Improvement of epidemic localities in Tottenham.

The following is a short instance from evidence cited in a report on an examination by Dr. Waller Lewis, of some of the former epidemic localities at Tottenham:—

"Dr. Hicks agrees with all the other medical gentlemen "whom I consulted, in saying that there had been a most "marked decrease in the number of cases of diarrhœa this "year." He adds, "My club patients have been remarkably "free from fever and all that class of diseases that are engen-

" dered or increased by filth. Those patients who live in " Union-row and Waggon Horse-lane say that they never " knew the atmosphere so sweet as it has been since the " privies have been exchanged for closets.

" The only case of English cholera that I have had to " treat during the autumn occurred in a house not at that " time connected with the works." " I have seen no " dysentery at all this year."

Improvement of epidemic localities at Ottery Saint Mary.

In a report of an examination of some former epidemic localities at Ottery Saint Mary, where the combined works under the Public Health Act have been applied to the cottages, Dr. Lewis gives the following instance of results, which may be confidently expected to follow generally from the applications of the like means:

" Mr. H. Hayman, the poor law medical officer, states " that the accumulation of dung, manure and house refuse, " that were formerly lodged on all the back premises, and " preserved for applying to the cottage gardens of the people, " are now rarely met with. These heaps were the cause of " typhus fever so constantly prevailing in the cottages of the " poorer people. Mr. Hayman has no hesitation in saying " that there has not only been less fever but less illness of " all sorts, since the combined works were begun to be laid " down than during any of the previous time he has prac- " tised in Ottery. There was always present so much fever, " that up to a late period it was known by the name of the " 'Ottery fever.' Formerly his fortnightly return to the " board of guardians generally occupied four sheets of paper, " it now rarely exceeds a sheet and a half."

Efficient sanitary works are a pecuniary benefit to owners of property.

The owners of the poorer classes of tenements, who oppose measures of improvement, from the notion that the occupiers cannot remove from them, and that the outlay on improvements will be thrown away, are mistaken in their opposition on merely pecuniary grounds; much more so are the owners of those classes of houses in the metropolis, or in provincial towns, which are occupied by classes of persons who can remove from them.

Rugby has become a more desirable place of residence.

In a report on some former seats of epidemic disease at Rugby, and as an instance of the improvement perceived, Dr. Lewis states,—

" Lady F——— informed me that before the new sanitary works she had found the health of herself and family so affected from impure atmosphere caused by defective drainage, that she had intended leaving the town.

" During the present year so great has been the improvement in this respect that she has settled to remain."

The like advantages are obtainable for the metropolis by the adoption similar principles.

It is only necessary to advert to the coincidence of the results thus obtained with the results obtained in various blocks of houses in the metropolis. There is nothing but the continued disregard of the evidence set forth in the first sanitary report of 1842, in the reports of the Health of

Towns Commission of 1845-6, in the sanitary report of 1848 and 1849, to prevent the same results being obtained generally with greater certainty throughout the whole of the metropolitan districts.

If pipe sewers keep themselves clear when only part of the connexions for which they are intended have been made they will do so when all the connexions for which they were designed shall have been made, and more water flows through.

Next to the rule above described, to the effect that channels that are smooth and in which the flow of water is concentrated require a greater fall than a channel which is rough and in which the flow is diffused, another elementary proposition may be challenged as being against fundamental facts, the knowledge of which is necessary for devising such works; namely, the principle as laid down by their engineer, and adopted by their chairman on behalf of the Commissioners, that the working of pipe sewers, to which only a part of the house drains have been joined on, cannot be judged of in respect to the then manifest power of self cleansing with a small flow, and that there are chances of failure which must be looked for as the flow is made larger and stronger.

The proposition is thus stated by the chief engineer:—

"The reports to Viscount Palmerston upon Rugby, "Sandgate, Tottenham, the parish of St. Thomas, Exeter, and "Barnard Castle, would appear to give the result of the "experience of the house drainage of those places through "pipe sewers for the last two or three years; but upon a more "close investigation it appears that the main sewers only were "during that period completed, ready to receive, it is true, but "not then actually receiving, the house drainage, or at most "but an inconsiderable portion of it. About two years since, "the drainage of the houses only commenced being turned into "the pipe sewers, and this work is not yet completed; so that "up to the present time those places, even if failures had "occurred, would afford no real experience upon the subject." The Chairman of the Commission of Sewers, Mr. Jebb, also says, that "in none of the five towns named have the works "of private drainage been commenced more than a year and a "half, in some they have been commenced more recently, in "none are they yet complete. In none has sufficient time "elapsed to give them a trial."

The simple fact is, that such self cleansing powers as are displayed in pipe sewers when only a part of the house drains are joined on to them, and when they have only a comparatively small proportion of the appointed flow and sweep of water in them, instead of affording *no* real experience, "afford *a fortiori* and conclusive demonstrations upon the "subject, because they are working satisfactorily under the "greatest possible disadvantage."

When a single house drain is introduced into an entirely new line of sewer, the flow is diffused over the line and may wet only a portion of it. When a few or a small proportion of the house drains are made to communicate with the sewers, the flow is diffused over a large fractional area and is retarded, and deposit takes place, the effect being similar to that of large flat-bottomed sewers with small flows of water. To

prevent the occurrence of obstructions, particularly in those lines where there are likely to be few junctions, several engineers have provided means of flushing in the first instance, which they are well aware will not be required regularly, or at all when the sewers are completed by the whole of the house drainage being received into them. When they are in full action more heavy matters may be admitted into the sewers than it was safe to introduce before, because there will then be a more certain and powerful sweep of water for their removal.

Surface drainage can be safely admitted into pipe sewers, when all the connexions from houses have been made.

That which is carried down rugged kennels on the surface of the streets will be carried away more effectually by the smoother channel beneath, provided an equal flow of water can be insured. Competent officers will have no difficulty in the introduction of surface drainage from roads formed of broken granite into sewers where an adequate flow of water is provided.

Drainage in provincial towns does afford proof of the applicability of the same principles to the metropolis.

Instead of the new drainage works with incomplete junctions in very small towns affording no evidence applicable to the drainage of the metropolis, they will, properly considered, be found to afford evidence applicable *a fortiori* of the utmost value; because in the metropolis, from the greater size and number of houses on a given area, from the greater quantity of sewerage within it, and the power of obtaining larger combinations, more powerful sweeps with half full or nearly full pipes may be more extensively ensured.

Artificial flushing of pipe drains is unnecessary when the connexions have been made from all the houses.

When the new pipe drainage was laid down in the first block of houses drained in Westminster, provision was made for flushing them, but after a short time the apparatus was found to be unnecessary.

In the report on the smaller towns which the Commissioners of Sewers have presented, the provisions made for flushing the sewers in the first instance, and to remove any obstructions which might occasionally occur have been represented as provisions for regular use, and as being regularly used. Thus, the surveyor of the Local Board for Tottenham states, that he has used the flushing apparatus in some of his flattest districts, not because he had any knowledge that it was required, but in order that he might ascertain the actual state of the sewers.

In reply to a similar representation of the engineer to the Sewers Commission that regular flushing apparatus was in use at St. Thomas's, the surveyor states, "Mr. Bazalgette "speaks of the frequent flushing of the sewers at three places "constructed for that purpose. Now, the fact is, that only "one shaft has been constructed for flushing purposes; and "this, as already stated in our report to Lord Palmerston, "was provided as a matter of prudence in the most level por- "tion of the main sewer, before experience had shown that "no flushing was required.

"It is true that the experiment of flushing has been tried

occasionally at this point, but this has only tended to show that there is no real necessity for it, and that no important accumulations existed; the ordinary flow of sewer water, with the occasional assistance of surface water in rainy weather, having proved quite sufficient to clear the sewer without artificial aid."

In the report which I presented to your Honourable Board, on Tottenham, are the following words on the same subject.

"Mr. Pilbrow has pointed out the mis-statements of Mr. Bazalgette as to flushing properly constructed pipe sewers.

"I think the flushing shafts and manholes, which Mr. Pilbrow has provided, quite unnecessary. Mr. Bazalgette has stated the matter so as to induce the belief that there is a periodical flushing to remove deposits, and consequently that deposits accumulate."

"Mr. Pilbrow states that the flushing has only been occasional, and was done merely that he might satisfy himself that there was no deposit. Flushing of sewers would not affect the smaller house drains, which are the most liable to obstruction.

"The operation may well be dispensed with, therefore, except for the purpose of proving that the sewers are free, which it is certainly capable of doing in Tottenham, as elsewhere.

"Before having acquired practical experience, Mr. Pilbrow thought that flushing might be necessary for the public sewers, and he provided the means of doing it. But he has become convinced, by practical experience, that flushing is not required.

"He has proved that the sewers keep themselves clean without flushing, and therefore flushing is of no advantage to them.

"Again, the process is no doubt serviceable in demonstrating that the drainage is free from obstruction; but inasmuch as it serves as a handle of opposition against the principle of the drainage, it is to be regretted that such an arrangement for flushing was made."

The engineer's assertion that pipe sewerage is not adapted to receive surface drainage.

Akin to the error in principle above described, and not less opposed to the physical fact, is the declaration of the engineer to the Commission, in his statement, "That as a "general rule, pipe sewers are not adapted to receive the "surface drainage from those roads and streets upon which "there is any considerable amount of traffic;" which implies that channels which are smooth, and in which the flow is concentrated, are not so well adapted to receive the surface drainage as channels which are rough, or as large brick sewers in which the flow is diffused and weakened. The Chairman of the Commissioners, adopting their engineer's view, represent that there is in the five towns "a double

Allegation of a double system of sewers in

" system of sewers. 1. A set of old brick sewers, originally " constructed for surface drainage, and now maintained for " that purpose out of the public rates. 2. A set of newly- " constructed pipe sewers, chiefly or exclusively for the recep- " tion and discharge of house drainage. The entire sewerage " of the town comprehends both sets of sewers, and its cost " is really the cost of both, and not the cost of the new pipes " merely, as a person, deriving his information from the " reports sent to your Lordship, might possibly suppose."

towns under the Public Health Act.

The Chairman states further, " Whatever may be the case " in small country towns, it will not answer to provide sewers " merely for ordinary rain-falls, not exceeding, at any time, " a quarter of an inch per diem; provision at the rate of two " and a half inches per diem must be made for storms."

These statements show that Mr. Jebb is entirely misinformed on the whole subject. Under the new system, instead of storm water, or surface water, being omitted from the calculation, it has been carefully provided for. In your Honorable Board's minutes, the results are given of analyses made of the rain water, the surface washing of streets, showing that it contained, on streets of great traffic, as great amounts of impurity (*i. e.* fertilizing matter) as ordinary sewer water, and that there were no grounds for its exclusion on that account. In the same minutes, p. 67, you have given, for the guidance of engineers, a table showing the quantity of covered surface from which circular sewers (with junctions properly connected) will convey away the water coming from a fall of rain of one inch in an *hour* with house drainage, " founded on the only observations of consi- " derable extent which are yet known, and made in the " sewers themselves."

The chairman of the Metropolitan Commission of Sewers entirely misinformed.

So far from two systems of sewerage, the General Board has recommended that provision should be made in the one system for taking a rain fall of one inch in an hour, besides the house drainage.

In p. 86 of your published instructions, plans are given of " cesspits for the detention of road detritus," to prevent its discharge in injurious quantities into the ordinary pipe or other sewers.

Your Honorable Board scarcely ever contemplated the separation of the house drainage from the surface drainage, except in the instances of some bank or valley lines, where natural water-courses had been injuriously converted into town sewers.—*Vide* " Report on the Supply of Water to the Metropolis," pp. 230, 231. With these exceptions, and the exceptions of hill-side waters, or that falling on uncovered suburban areas, you have generally resisted any separation of the surface drainage from the house drainage. Where, however, old sewers have existed, neither your Honourable Board nor your engineers have been able to induce the Local Boards to entirely abandon them, or pull them down, where there was any semblance of a use to which they might be applied, but the construction of a second set of sewers for the purpose has never been sanctioned, or, indeed, been proposed as necessary for the purpose.

The General Board has also urged on local boards arrangements for the reception in the same sewers of the surface drainage from the roads, and advised as to dealing with detritus.

No second or double system of sewers for surface drainage has ever been sanctioned, proposed, or even contem-

plated in towns under the Public Health Act.

At Croydon much inconvenience has arisen from the connexion of the new works with the remaining old house drains and sewers, the smells from which there is reason to believe pervaded the new works, and were erroneously attributed to them.

No double system at Tottenham.

In my remarks upon Mr. Bazalgette's Report on the *new works* at Tottenham, I have said, "It is not to be wondered "at that the Chairman of the Commission, addressing the "Secretary of State for the Home Department, should state "officially, 'From this Report the following *facts* may be "'collected, that in each of the five towns there is a double "'system of sewers,' &c. &c. This is stated as a *fact* with "respect to all the five towns. Your Honourable Board has "got, from the engineers of the other places in question, the "most emphatic contradiction; and what is the fact with regard "to Tottenham? Before any sanitary works existed, a great "portion of the refuse of the town had been cast into open "ditches and natural water-courses; and as these places "became offensive, and injurious to health, portions of them "were from time to time covered in with bricks.

"The term *system* of drainage, however, is totally misapplied to them, whether considered as to their extent, their character, or the object effected.

"The public sewers of the new system are 13 miles in length, but these old covered ditches are only about $2\frac{1}{2}$ miles on the whole, including all sizes, from 12 inches diameter to $5\frac{1}{2}$ feet high by $4\frac{1}{2}$ wide.

"Many of them, being natural water-courses, could not have been filled up; and it would have been folly to have destroyed any capable of taking surface water, merely that another might be constructed for the combined purposes of house and surface drainage. Over the very small extent, therefore, in which they exist they have been cleansed from filth, and permitted to receive surface water, and properly so. I have the authority of Mr. Pilbrow and my own examination for saying, that no system of brick sewers existed in Tottenham before the new works were constructed, that no brick sewers have been constructed there under the Public Health Act, and that no such system is required or contemplated. Mr. Pilbrow says, that if he were compelled to construct brick drains for the removal of surface water, he should make them immediately below the surface, and still have back drainage by pipes for sanitary purposes; and that the two together would cost much less than one large system of brick sewers, irrespective of the consideration of efficiency."

No double system at St. Thomas, Exeter.

Mr. Dymond, the surveyor to the local board at St. Thomas's, Exeter, in reply to the statement made by the engineer of the Sewers Commissioners, that "before the "new works were contemplated the surface drainage was "provided for by means of some old brick sewers and cess-"pools. These old sewers and cesspools still exist, and

"in addition thereto 31 new gullies have now been con-
"nected with the new sewers," states that—"An ordinary
"reader of these words would very naturally infer that the
"new works are not complete in themselves, and that the old
"are still employed in aid of them; in short, that the old
"sewers and cesspools not only *exist*, but are in *use*. Such an
"impression would be erroneous. The new system was de-
"signed without reference to the old; and the latter, though
"not yet entirely removed, has long ceased to be used, with an
"exception so inconsiderable, that it cannot be held to invali-
"date the general allegation."

No double system at Barnard Castle.

Mr. Ranger, the engineer who laid down pipe drainage works for Barnard Castle, states in reply to the report in question on that town,—"The report begins by stating that "the town drainage is divided into two separate and distinct "systems of sewers:—

"1st. Those sewers originally provided to carry off the road and surface drainage.

"2d. Another system of sewers recently provided under the General Board of Health, to carry off the house drainage.

"The inference intended to be drawn from the foregoing sentence is plainly this: that in laying down the pipe sewers the road and surface drainage was excluded, because the former was not thought suitable to carry off the latter.

"But the facts of the case are these. Till the execution of the new works, there was no proper system of sewerage whatever in Barnard Castle. There were, indeed, as in most towns of the same class, some few shallow drains, which had been formed by the highway surveyors, but these had never been intended to receive house drainage; they were originally formed for the duty they now perform, viz., to carry off the rain water from the surface of the roads.

"Consequently, when I was instructed by the local board to lay down for them a system of sewerage, and in connexion with it, one of the water supply (I did what every one else would have done in my place), I made use of the existing sewers as far as they were available.

"For the reception of house sewage I provided a system of pipe drainage distinct from that of the old sewers, not because I considered the former unsuited for the reception of the surface water, but because the means of carrying off the latter were already in existence.

"Mr. Bazalgette, speaking of the surveyor's opinion of pipe drainage, says,—'The surveyor is of opinion, derived 'from experience, that the successful working of pipe sewers 'is essentially dependent upon perfect workmanship and 'water-tight joints, with an abundant supply of water, and 'the exclusion of surface drainage coming from the roads.'

"Now, the surveyor here spoken of is not Mr. A. Morgan, alluded to by Mr. Bazalgette in the early part of his report, as the gentleman having charge of the execution of the works,

but Mr. Brown, the clerk to the local board, who, in consideration of the limited resources of the district, has undertaken to combine with the duties of that office those of local surveyor also.

But Mr. Brown is not an engineer, and I have reason to know that, when he gave Mr. Bazalgette all the information in his power respecting the Barnard Castle works, he had not the slightest idea that any remarks of his were to be quoted as "the result of the surveyor's experience." One of these is reported to have been, "that he (Mr. Brown) considered "the exclusion of surface drainage coming from the roads "essential to the successful working of pipe sewers.

"Mr. Bazalgette has misapprehended the purport of Mr. Brown's remarks, as the latter said nothing about the exclusion of surface drainage from the pipes, though he did say, that he considered it most important that means should be used to prevent the road detritus from being carried into the pipes along with the surface water."

No double system at Rugby.

The reply of Mr. Rammell to the representations made from the Sewers Commission office, in relation to the new system of sewers at Rugby, is in the following terms: "The "road drainage, says Mr. Bazalgette, is carried off mainly by "the old brick sewers originally constructed for that purpose; "but there have been about sixteen road gullies connected "with several of the new branch sewers, and the outfall of "the old surface drains is connected with the new pipe sewers "near the outfall of the latter.

"The new system was laid out to receive the surface waters as well as the house drainage of the whole district. In the first instance some lengths of the old brick drains were temporarily retained, and received the surface waters in the parts in which they existed; but they have been so used only as long as house drainage also passed into them, and gradually as the house connexions have been made with the pipe sewers instead of with the brick drains, the surface waters have also been passed into the former and the latter dispensed with. The parts of the town in which short lengths of the old brick sewers still receive surface waters are principally in North-street, Pindar's-lane, Chapel-street, and Pennington-street. In a word, at the present moment, so far "from the outfall of the old surface drains being "connected with the new pipe sewers near the outfall of the "latter," the whole of the surface waters of the town area are now received into the pipe sewers, either directly or through the intermediary of the few remaining portions of brick sewers within the limits of the town itself; the three nearest points to the outfall at which surface waters in any quantity are passed into the system of pipe drainage, being respectively at distances of one mile, 500 yards, one mile and three quarters of a mile from the outfall."

Omission of the engineer and Chairman

Amongst the reports on the pipe drainage works which have been presented to Parliament at the instance of the

Metropolitan Commission of Sewers is a notice of the pipe sewers at Manchester, but without notice that the experience there on the point at issue is, upon a proper observation of the subject, available within the metropolis itself.

of the Metropolitan Commission of Sewers, to show that a chief object of the pipe sewers in Manchester is the reception of surface drainage from roads and covered and uncovered surface.

The following is the account by the Manchester surveyor of the working of pipe sewers, almost in the reverse condition represented by Mr. Jebb to have been contemplated by the General Board of Health; that is, a condition mainly for the removal of surface drainage, the house drainage there being comparatively inconsiderable; that city being yet on a site of cesspools and cesspool oozings, the house drains are merely used to receive the overflows.

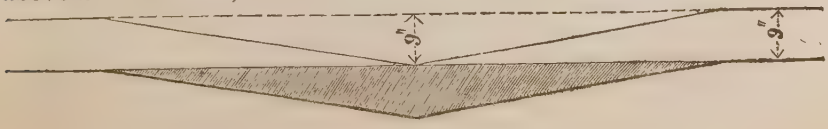
Under these circumstances there are 30 miles of pipe main drains or sewers, and 25 miles of pipe branch sewers, laid in 500 streets and 250 courts and passages. The Manchester surveyor states, that "they serve as main sewers in clusters of streets as well as in single streets." The tube sewers in Manchester have also to do precisely the same duty that the brick sewers have; there is no difference as to the sewage sent into them. They take all the surface drainage of the streets, &c. where they are laid, and have a pair of gully holes in every length of almost 30 yards of the street: he says, "I think the idea of requiring that the main "sewer of every street must be large enough for a man to "go through is absurd and mischievous, because involving, if "applied throughout the country, an awful waste of money."

Pipe sewers, within their proper limits, are equally as suitable for London as for provincial towns.

In relation to the objection made by the Metropolitan Sewers Commissioners, that pipe sewers may be sufficient for the streets of small provincial towns of little traffic, but are utterly inapplicable to London, it may be here observed that this statement admits of disproof from experience within their jurisdiction; but if there had been no such experience, that might have sufficed which is presented by Manchester proper, where the cart and waggon traffic is greater than that upon probably nine tenths of the covered area of the metropolis.

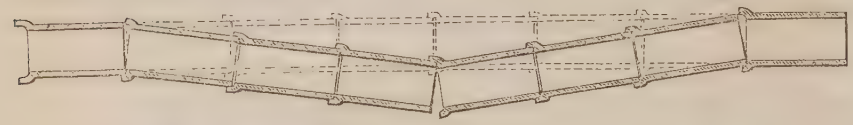
The engineer, in his report to the Commissioners on the pipe sewers, says:—

"I have observed a want of uniformity in the depth of deposit in various parts of these sewers, and the men employed in flushing out the pipes in some of the flat districts state that sometimes a pipe will stop up in one place whilst it is clear in another, and this very shortly after the pipes have been flushed out. There are two or three ways in which this may be accounted for: if a settlement take place in a 9-inch pipe sewer to the extent of 9 inches in one part and not in another, it may be full at one point and clear both above and below it; thus—



or a heavy body, by resting in one place, will gather the smaller matters around it, and form a bar across the pipe in that spot; or the drains from some of the houses may discharge a large proportion of water as compared with the solid refuse, whilst others bring down but little."

Now on a view of the diagram itself, it must be observed that such a large sinking must be in a loose open soil; and that the earthenware joints, instead of expanding and closing as he has pictured them, must open as beneath,



and let the water out.

The diagram published was calculated to convey the impression, that pipe sewers were of such delicacy of construction that stoppages were unavoidable. This was made the chief objection to the drainage works at Croydon, and it was sent forth as if the objection had been verified there; but it was decidedly negatived as having ever occurred in practice. Not one single case of the kind could be got out as having occurred in the whole town, in which 2,000 houses were drained, some of them with very imperfect works.

Separate drainage of blocks of houses, as a general principle, is wasteful of cost and efficiency.

The persistence of the Metropolitan Sewers Commissioners in the separate drainage of houses will, when examined, be found to be a persistence in a bad fall and extended frictional area, and a consequent comparatively slow discharge of the sewage from beneath the houses, just at the point of town drainage where it is of the utmost importance that all the power of sweep should be economized, and that discharge from the sites of houses should be quickened, namely with the smallest drains, the house drains. Mr. Jebb, speaking on back drainage, states that even in towns under the Public Health Act it is not always adopted. If your Honourable Board refers to pages 10 and 15 of Mr. Bazalgette's report, you will find that at Rugby and Sandgate it is said to be generally repudiated.

Mis-statement of Mr. Bazalgette as to back drainage of towns under the Public Health Act.

The replies displaying the basis of this representation may be summitted to attention. "Separate drainage," says Mr. Bazalgette, speaking of Rugby, "for the houses has been "generally adopted in preference to combined back drainage, "because it was found that the latter system interfered con- "siderably with the rights of private property, and it was "impossible to get the owners of different properties to agree "to the united execution of combined works."

Mr. Rammell states in reply, "that back drainage has "been generally adopted, and in combination, as a rule with "the smaller class of houses." He mentions several cases of groups of houses, as in Ryder's court, one of 16; in Warwick-street, one of 12; in Pindar's lane, one of 21; and in High-

street two or three cases of small groups; and he states that upon the whole "about two thirds of the houses in the "town are back-drained, in groups varying from two or "three each to 16 or 20."

"Separate drains," says the engineer to the Metropolitan Sewers Commission, speaking of Sandgate, "for houses, has "been adopted in preference to combined drainage, because "it was found to be very difficult to get the owners of "property to agree to carry out the latter, and the system "of draining the houses separately was in general more "satisfactory in the results."

Mr. Rammell states, that "separate drainage has been "most usual, not however for the reasons stated, but "because there are in this place very *few blocks of houses* to "which the principle of combined drainage was applicable; "but that wherever the principle could be, it has been acted "upon, and that he is not aware of any case in which "difficulties were raised against so doing by owners of "property."

As to the alleged necessity of large sewers for men to enter them.

As rebutting the denial "that it is necessary or advan- "tageous that sewers should be of such a construction as to "enable a man to enter them, for the purpose of cleansing "or repairing both them and the house drains," Mr. Jebb, in his letter points out, in the following terms, the condition of the low-lying and tide-locked districts, as places where brick sewers must inevitably become sewers of deposit. "The Board of Health questions, I believe without any "qualifications, this necessity and advantage, *i. e.* of con- "structing street sewers, in all cases, of such size that men "may enter and cleanse them." He says, the necessity must be patent in one large class of cases, namely, where the sewers, of whatever construction or material, must inevitably from their position become mere "sewers of deposit."

"This happens with reference to the lower parts of all, or very nearly all, the sewers of London, the mouths of which are now closed for about eight hours of every tide, or about two thirds of the entire day.

"The depths at which they must be kept enable them to discharge into the river only at low water; the rest of the time they are closed up, and therefore stagnant for a considerable length from the river. During the period of stagnation deposits unavoidably form and accumulate, which can only be removed by manual labour, flushing would not effect it; now the accumulation of deposit under such circumstances has nothing whatever to do with the size or material of the sewers, it would equally take place with pipe sewers of the very best material and workmanship."

In all this it will be observed, that Mr. Jebb never seems to imagine that a remedy for such a state of things is not merely possible but easy, namely, by pumping from the

low shore districts with sewers of proper size, form, and material. It may be taken as an axiom, either for brick or pipe sewers, that proper drainage ceases when deposits begin; and that where the natural inclination is inadequate to prevent deposit, an artificial inclination must be obtained, or the drainage will also be inadequate.

Now it is in the low-lying districts in this same condition that pipe sewers have been laid, which are returned to Parliament as having accumulated deposit, and it is in respect to these in particular that the charge of misrepresentation attaches, in the omission of any mention of the condition under which they must have stopped.

Depositing sewers are not necessary.

Your Honourable Board certainly does deny the necessity, in any case, for any form of sewers of *deposit* in the metropolis or elsewhere. The subject was early investigated, and the investigation was renewed, when Sir William Cubitt and several other engineers had suggested the necessity of bringing in a river of water for the flushing of sewers, and when it was assumed that deposit must generally accumulate in them, and that additional supplies of water must be provided specially for cleansing them. On the investigation and the examination of the facts in the possession of the officers of the Sewers Commission itself, it was proved that the system of large reservoir sewers for the low-lying tide-locked districts was both expensive and mischievous, and that it would be cheaper to make smaller sewers, with a proper inclination for their constant clearance without flushing, and to maintain their constant action for the relief of the district by constant pumping. Mr. Lovick, the officer in charge of the flushing operations for the Commissioners of Sewers, was asked,—

"You, of course, have had to flush the sewers in the Surrey and Kent district, and have observed there the effect of the intermittent discharges of the drainage matters, which are backed up and kept within the district during the high water in the discharge of the sewers there; is not the sewage matter decanted off, leaving the matter deposited, and what are its effects?—Yes. From the drainage matter in this district being locked in for many hours in each day, a very large portion is deposited, and when the outlets become free, then the liquid portion, but with a slight amount of the solid matter, is decanted off, or it flows into the Thames. And as the reservoir sewers become full, the foul gas is expelled from them through every opening into the public thoroughfares and into the private houses; and the generation of foul gas is quickened by the stagnation of the drainage being continually formed and continually expelled by the progressive accumulation, so that not only are mechanical difficulties created, but health is jeopardised by this arrest of the flows.

"Have you estimated what would be the quantity of water required to flush away this matter?—It would be difficult to

do so, as (owing to many of the collateral and parts of main sewers being below their outlets; to irregularities in them; and to the unavoidable deficiency of fall in even the best constructed lines, from much of the district being below high water, and from the drainage being locked in by the tide about two-thirds of the time) it is impossible to remove much of the deposit from many of the lines. The present quantity of water, with the immense volume now procured from the Thames through the various sluices, probably at least from eight to ten times greater than the ordinary sewage flow, is wholly inadequate to keep even many of the better class of the low level sewers clean."

Desire of engineers to continue the pollution of the Thames.

The engineers of the second consolidated Commission had declared for continuing the practice of discharging all the sewage into the Thames, which they called "the natural method," and against the adoption of a proposed plan of pumping, which they called an "artificial method."

Upon these views your Honourable Board observed:

"The engineering inspectors of the Board agree in estimates which show that the expense of sufficient pumping would be greatly below the expense of sufficient flushing for the relief of the lower districts.

"The Board has already stated that, by ascertaining the actual rates of the consumption of water, and approximating more closely to the probable consumption under an improved system, the data and the condition of the questions are generally altered and rendered more certain.

"By extended observations as to the inclinations at which existing sewers are kept clear of deposit by the ordinary run of sewer water, data have been obtained for determinating with certainty the inclination at which deposits may be prevented by pumping.

"By extended trial works it has been proved, that by improvements in the manufacture of earthenware pipes, by rendering them more accurate in form and smooth in surface, the rate of flow of the same quantities of water at the same inclinations, as compared with the flow in sewers of the ordinary construction, may be accelerated from one-fourth to one-third.

"By a better observation of the quantities of pipe water required to be pumped, and of the rain fall, a better estimate may be made of the expenses of pumping out the gross quantity of water and conveying it away.

"In some of the plans of engineers, and in the statement of the Commissioners of Sewers, when referring to the discharge of sewer water by the intermittent system when the tide is down, they speak of it as a 'natural method,' and, as such, preferable to the discharge by any system of pumping, which they designate as 'artificial,' and therefore to be avoided. We apprehend, however, that there is scarcely anything natural about the case; the banking out of the river, the

erection of tidal gates, and the arrangements for intermittent drainage and flushing, all being artificial.

"Large areas in this country and in Europe are now profitably drained by artificial means for agricultural use only, which must, if left to 'a natural method,' be permanently under water.

"That which is done for large and wide districts of bare land, many feet below the sea, may be effected with singular advantages on much smaller areas crowded with human habitations, and worth, comparing area with area, more than a thousand times as much in money value alone, and infinitely more when the stakes of health and life are considered.

"The fact appears to be unknown, or unattended to, that when, as in the lower districts of Westminster, the flow of the sewer water is arrested, and the matter in suspension thereby deposited, it requires a far larger quantity and power of water to lift, and again get it in motion for removal, than would have continued it in motion at the same inclinations; as the extra quantity of water required in such cases for flushing on the intermittent system of drainage must, when there is no rainfall, or when the rainfall is insufficient or irregular, be artficially obtained; pumping at the lower level, as proposed in cases of insufficient fall, can only be avoided by pumping a greater quantity at the higher level.

"The question, then, is admitted by practical officers to be one of greater or less pumping at one end or other of the apparatus."

The following estimates are deserving of consideration as measures for the relief of the low lying districts.

"The case of the removal of refuse from districts below high-water mark being analogous, in the present condition of the sewers, to that of its removal from extended cesspools, we directed Mr. Rammell, from the special attention which he had given to the practical application of the principle of removing refuse in suspension in water, to consider of its application to the lower districts of Surrey, and to estimate the expense of relieving that area by pumping, and discharging its refuse at a point where the tide should not bring it back again within the precincts of the metropolis.

"It will be seen that Mr. Grant's estimate of the expense of the intermittent cleansing and flushing of the main sewers amounts to an annual charge of 2*s*. 6*d*. per house per annum. It appears to us, however, inequitable, that the whole charge of removing soil or storm water from the upland districts should fall upon the occupiers of the lower districts, who are encumbered by it. From the tables which Mr. Rammell gives, it follows, that to pump and provide for the discharge of the sewage, including two feet in depth of rainfall of the district, would involve an annual charge per house and per inhabitant as follows:—If spread over the district and discharged at Deptford, per house, 1*s*. 0½*d*. (12·33*d*.) per

inhabitant, 2*d.* (1·97*d.*) Discharged at Woolwich, per house, 1*s.* 10¾*d.* (22·56*d.*) per inhabitant, 3¾*d.* (3·61*d.*) Discharged at Erith, per house, 2*s.* 8¾*d.* (32·71*d.*) per inhabitant, 5¼*d.* (5·23*d.*) If spread over the entire metropolis and discharged at Deptford, per house, 3¼*d.*, per inhabitant, ½*d.* Discharged at Woolwich, per house, 5¾*d.* (5·67*d.*), per inhabitant, 1*d.* (0·90*d.*) Discharged at Erith, per house, 8¼*d.* (8·21*d.*), per inhabitant, 1½*d.* (1·31*d.*)."

More water than the drainage of all London is now pumped by a set of three engines in Holland, while in London only the sewage within tidal influence would require pumping.

"In Holland, three large Cornish engines, erected under the direction of Mr. Arthur Deane, pump out from an area four times as large as the covered portion of the metropolis, ten times as much water as is pumped into London by all the existing companies.

"We might base our recommendation, in respect to the lower districts, on the long practical experience of the relief of extensive districts in England from surplus water by pumping.

"In Lincolnshire, the expense of pumping away the surplus rain water averages 2*s.* 6*d.* per acre per annum, including all expenses of working with engines not of the most recent or improved construction. Calculating, however, that the expense of pumping the soil water or waste pipe water, in addition to the rain fall, would cause a cost twelve times greater than is incurred in agricultural fen districts, or 30*s.* per acre covered with houses per annum; as there are in the lower districts of the metropolis about 20 houses to each acre, and as the operation would extend only to about half of the metropolitan area, the annual charge per house spread over the whole area would be 9*d.* per house per annum; but in this instance, as is shown in almost the whole range of the investigation, the rate and the outlay would be a means to the reduction of existing charges."

The Commissioners did adopt the principle of pumping from the low lying districts.

On further consideration, and on the agitation of the *Times* newspaper against the discharge of the sewage into the Thames, the principle of pumping was adopted by the Commissioners of Sewers for the conveyance of the sewage beyond the tidal influence, and plans were prepared for the purpose by Mr. Frank Foster.

But appear again to have abandoned it.

During the last session, however, the Commission appeared, from the course of the opposition to the measure called the Great London Drainage Bill, to have reverted again to an opposition to the principle of pumping, and to a determination to discharge all sewage into the Thames.

The following is the evidence of their chief consulting engineer on the point:—

"If the Thames were made, as it might be made, a much better outfall than it is now for taking away the land waters, and with the land waters the sewage waters; if that were improved, as it might and ought to be, so as to have a deeper channel at all times, and no dry shores, and the water for culinary purposes, as is now being done, all taken from the Thames above the tideway; in my opinion there would be no

necessity for the public disturbing themselves about the Thames river. They would not make it altogether free from filth; do what they could, they could not make it half free; and therefore if all necessity for taking away the remaining part of that filth is done away with, the expense need not be incurred. Moreover, London might be so drained, as it wants to be properly drained, by a means which will take the whole of the sewage down continually, and deliver it below low water mark, at all tides and at all times; it will then be no nuisance to the river or to the people. I do not believe that anybody ever smelt the Thames; they have smelt the drying mud and the stench of 50 sewers opening into it with wide open mouths, as I have many a time; but the Thames itself I do not think need be at all a nuisance. I will show why, if I can.

"3400. You spoke of the open mouths of the sewers; would you carry the sewage further out by pipes?—I would carry large sewer pipes of cast-iron, and pipes that would bend to the shape of the bottom of the river, down close on the bottom, so as to take the shape of the bottom, so that their mouths should be at all times below low water mark. Then if every main sewer was ventilated, as ought to be done, there would be enough draught of foul air going out at the top of the town in 500 places, more or less, according to circumstances, ventilated as the upcast shafts of coal mines are, and the sewers would be sweet to go into, and kept ventilated by the fire. Then there would be a delivery of all the sewage into or below the surface of the Thames at all times, and the stench that now keeps coming up in our streets from the sewers would be completely done away with."

"3477. The great desire was to get rid of the impurities from the Thames?—The public have talked a great deal, and have always done for the last thirty years, without knowing what they talked about; and newspapers wrote to call the public attention to it."

And were induced again to provide for it.

Later on, however (as it is understood, on Lord Palmerston's expressions of opinion), the principle of relief by pumping was again provided for.

But appear once again to have changed their opinion in favour of depositing sewers and the Thames.

But from the recent statement of the chairman, that sewers of deposit in the tide-locked districts are unavoidable, it would appear that the relief of the lower districts by pumping is no longer contemplated by them.

Depositing sewers are unnecessary and unjustifiable evils.

On the evidence before obtained, and on all that has been herein stated, I have to submit to your Honourable Board, that as a question of sanitary and social economy, and as a simple mechanical fact, there is no case of justification whatsoever for sewers of deposit; and that "the practice of constructing large brick or stone sewers for general drainage, "which detain matters passing into them in suspension in "water which accumulate deposit, and which are made large "enough for men to enter them to remove the deposit by hand "labour, without reference to the area to be drained, has been

" in ignorance, neglect, or perversion of all proper and now " well established principles.

" That whilst sewers so constructed are productive of great injury to the public health, by the diffusion into houses and streets of the noxious products of the decomposing matter detained in them, they are wasteful from the increased expense of their construction and repair, and from the cost of ineffectual efforts to keep them free from deposit."

They are injurious to public health, and wasteful in the expense of construction, maintenance, and repair.

The cost of the private house drainage works, including the water closets, is stated properly as forming part of the works under the Public Health Act, but with the effect of augmenting the apparent expense when compared with the expense of brick sewers.

The cost of complete house drainage is included in the works in towns under the Public Health Act; but not in the statements of metropolitan expenditure by the Commissioners.

In passing and presenting this statement, therefore, the Commissioners admit that they do not recognize house drainage works as forming any part of their system, as they do not propose to exercise those powers of the Act which were provided for systematizing the house drainage, which powers are almost the same as the provisions in the Public Health Act, under which house drainage has on the whole been easily and completely effected as part of a general system of works.

The Metropolitan Commissioners do not recognize house drainage as part of their system.

It has already been shown what are the foundations on which it is wrongly alleged that the towns under the Public Health Act have a double system of sewers, one of brick for the removal of surface drainage, the other of pipe for the removal of the house drains. In addition to these, with better foundation, it is stated that a third set of drains is required, that is to say, of permeable land drains in addition to the impermeable pipe sewers.

Allegation that a third system of drains is needed for subsoil drainage.

The instructions in relation to the cases requiring permeable drainage are contained in your minutes circulated for the use of the Local Boards. But this third set, more properly second set, is not found to be so often required in practice as it was at first supposed. In a number of instances, the subsoil or spring water is admitted at the sides of the pipes, and a second set of permeable drains is rendered entirely unnecessary. The word "system" would be totally inapplicable to such drains, when perhaps three or four such, formed of cheap tiles, would be all that would be required for a whole town.

Where permeable drains happen to be necessary, the expense is inconsiderable. Plans and estimates for the execution of such works, for the drainage of Jacob's Island, and in relation to which one of their own officers, Mr. Grant, gave evidence that will probably be found in their own office, prove that there was no need of going beyond their own jurisdiction for comprehensive plans laid down as well as for plans executed, to show the economies obtainable by a proper attention to what had been proposed and done.

Evidence from the office of the Commissioners shows that in any spot needing such drainage it could be effected most economically by laying a few tiles.

In relation to one instance of a block of houses, he states,

"In a fourth block of 46 houses, the length of back drains is 985 feet.

"The length of separate drains would have been 2913 feet; cost of back tubular drainage, £66. 8*s*. 2*d*., or £1. 8*s*. 10½*d*. per house.

"Cost of separate tubular drainage, £262. 11*s*. 7*d*., or £5. 14*s*. 2*d*. per house.

"Cost of separate brick drainage, £614. 16*s*. 3*d*., or £13. 7*s*. 3¾*d*. per house."

"Have you made arrangements for sub-soil drainage as well as for relieving the surface of its water?—Yes.

"Will you describe the nature of that arrangement?—It is simply to lay agricultural tiles, varying in size from 1¼ to 4 inches, immediately under the other drains, in some cases over; and draining into the existing large brick sewers.

"What would be the additional expense per house of this?—The cost averages 4*s*. 2*d*. per house in Bermondsey, and 4*s*. 4½*d*. per house in another large block.

"What would be the expense per house of water supply, drainage, and sub-soil drainage?—These, including a dust bin to each house, and new closets, where required, average £6. 15*s*. per house; to pay off the principal and interest of which in thirty years, would require 8*s*. per annum, or 1¾*d*. per week."

Price of works is not lower in provincial towns than in London, if works be of the same description and proper.

The Chairman alleges that the prices of works are lower in provincial towns than in the metropolis, and cannot fairly be used as a standard of comparison.

In the majority of instances the chief materials of construction which have been used, the earthenware pipes, have been manufactured in London and sent to the towns where the new works under the Public Health Act have been constructed. As to difficulties to be overcome. In the provincial towns, there is frequently less of paved area to be taken up and replaced; but there are often districts to be dealt with as old and as densely occupied as any portion of the Commissioners' jurisdiction.

To counterbalance this, there is often a much longer length of both sewer and drain per house in a provincial town than in such parts of the jurisdiction of the Metropolitan Commissioners as have any drainage, or are likely to have any. In this respect the towns under the Public Health Act are far in advance of the metropolis, because the houses in their suburbs are often as efficiently drained as any in the district.

In such towns, therefore, the lengths and proportions of trunk main to the branch drainage is as great and relatively as expensive as in the metropolis, and the total differences are in reality inconsiderable: but the relative economy may be established by works in action, and completed without strict care in regard to construction or to economy, within the jurisdiction of the Metropolitan Commission, and by plans for the improved drainage of whole metropolitan districts, which plans, if not destroyed, are amongst their own records. One is a plan for the improved drainage of Jacob's Island; another is a plan prepared by Mr. Austin for the drainage

The fact may be established by works and plans connected with metropolitan sewers economically executed.

of the whole of Westminster proper, including the provision of pumping apparatus for raising the sewage from the Thames, and returning it to be utilized, in a less offensive form than the manures now used, among the market gardeners of Fulham.

The comparison of this plan of works may be fairly made with the large line of sewer called the Victoria street sewer, which, upon examination by the chief consulting engineer of the Commission, Mr. Stephenson, was declared upon his opinion to be good in principle and in construction. As your Honourable Board has stated in a previous communication to Lord Palmerston, the members of the Board who had been members of the first consolidated Commission had protested against the plan of the Victoria sewer, or one differing from it in no essential particular, as being bad in principle and rash and wasteful in construction. For a time its adoption was thus prevented, and Mr. Austin was directed to prepare another plan, in accordance with the principles deemed to be established by the evidence taken before the Commissioners of Inquiry into the Means of improving the Health of Towns, as well as that of the most experienced Sewers officers themselves, as taken before the Metropolitan Sanitary Commission.

The Victoria sewer brought forward.

Victoria sewer approved by Mr. Stephenson.

Its adoption and construction for a time prevented.

A more economical plan directed to be prepared.

After the withdrawal of the members of your Honourable Board from the Commission, the whole work objected to was put forward by Mr. Frank Foster, an engineer said to have been nominated by Mr. Stephenson. On the Board, as Metropolitan Sanitary Commissioners, sending for this officer to examine him on some larger operations of pumping and land drainage connected with the works of water supply, objections were made to his being examined, on the ground avowed that he knew nothing whatsoever of the subject. By him, however, the Victoria Sewer, which was considered to be the commencement of a trunk line for the whole of the south side of the Thames, was commenced and completed.

The large Victoria sewer again brought forward.

Victoria sewer considered and adopted.

Victoria sewer estimated to cost £13,854.

From a return laid before Parliament, it appears that the original estimate for this work was £13,854; that the sum returned as expended is £28,000, though it appears that additional items should be included, increasing the money actually spent to £33,000, that a portion of the sewer is in ruins; that the further sum of £15,000 is reported to be necessary to put it in what is deemed a proper condition; and that there are, besides, large outstanding claims for compensation on account of injury to property occasioned in the course of its execution.

Actual expense, £33,000.

Is partly in ruins.

£15,000 more required; besides large claims for compensation to property injured.

Now it has been estimated, from the results of trial works referred under the first consolidated Commission, as well as from works actually executed and in action in the metropolis itself, that the whole of Westminster proper, comprising nearly four hundred acres, might have been sewered, the pollution of the Thames avoided, and the sewage saved from that part of the metropolis, and pumped back to Fulham for the disposal of the Sewage Manure Company, at an expense not exceeding

Westminster proper might have had its main drainage completed for the money effectually, or the house drainage could have been completed and the

cesspools abolished.

twenty thousand five hundred pounds, for twenty three miles of the requisite improved sewers, which may be termed self-cleansing, as distinguished from the existing sewers; that the pumping works requisite for the delivery of the sewage, even as far as Putney, need not cost more than £6,500; or that, at the eventual cost of the single large sewer in question of less than one mile in length, the house drainage of every house in Westminster proper might be completed, and every cesspool abolished, as have been effected in the model dwellings and in the cloisters.

Relative cost of works to the rate payers.

As exemplifying the relative expense to the ratepayers of improved works and of those constructed on the old principle, attention may be called to the following statement made on the estimates of the expense of executing the plans of required works then prepared for the whole of Westminster by Lord Morpeth, in a charge to a jury assembled to assess the rates.

"The comparative cost of drainage works formerly constructed, and of those now proposed on spaces equally covered, would stand thus:—

PER LINEAL MILE.

	Annual Cost of Flushing, Cleansing, and Repairs.	Average Rate of Principal and Interest per House, reckoning 320 Houses per Mile.
	£ s. d.	£ s. d.
Expense of works as formerly constructed, 5,000*l.*	70 0 0	1 2 2¾
	Annual cost of pumping and Maintenance.	
Expense of the system at present proposed, 1,000*l.*	25 0 0	0 5 0

"The proposed works costing less than one-fourth of the former system." The expense of materials and service has been increased, and which would now perhaps slightly vary the relative expense of the works.

If peculiar dangers of the Victoria sewer had been avoided, the objectionable principle of its construction would have remained.

There were dangers peculiar to the Victoria-street sewer, arising from the unfavourable nature of the ground, of which warning was given at the time of its first proposal. Had these been avoided, the objectionable principle of its construction would have remained; and it has already been submitted that this objection is applicable to all sewers which accumulate deposit, and which require constant supply of water for their cleansing. The last time it was examined, this sewer was found charged with a considerable amount of deposit.

The continuation of the line of the Victoria-street sewer had been agreed to at an expenditure of 1,250,000*l.* for the north side of the river, for the south about 250,000*l.*, or on the whole 1,500,000*l.* for the main trunk lines of drainage.

Continuation of the line of the Victoria street sewer.

After having again contemplated the more extended use of the Thames as a main sewer, the Commissioners have at last proposed an outlay of three millions to effect that one object.

Three millions of pounds sterling now proposed for main lines of sewers only, in the metropolis.

One of the consulting engineers of the Commissioners is reported to have stated that, before the complete whole drainage works for the metropolis are completed on these principles, an expenditure of ten millions may be expected to be required.

Ten millions of pounds to be ultimately expended in the metropolis, for drainage on the principles of the Commission.

Now, on a proper consultation of the best recorded observations of the rain fall in the metropolis, and a due adjustment of the sizes of the channels to the service they would be required to perform, plans were laid down and estimates made by Mr. Austin, requiring an expense of only 710,000*l.* (now, however, on an "outside" estimate on increased prices, say one million) for main, intersecting, and discharge lines, but not including the capillary drains for effecting the first object, for which the present Commissioners propose to expend three millions of money, namely, avoiding the pollution of the Thames.

The objects of the three millions might probably be efficiently accomplished for one million.

Mr. Roe also drew out, on the like data, a plan for the main trunk lines for preserving the sewage of the north side of the metropolis from the Thames.

His plan was on nearly the same lines, and his estimate was very little in advance of that of Mr. Austin, being about 600,000*l.* Mr. Roe says that Mr. Foster frankly stated to him that he thought his, Mr. Roe's, plan the best, but that the engineers in the Commission preferred the more expensive forms of works.

The proposed expenditure of three millions on the trunk lines of works would, however, leave the cesspools in the houses untouched; and the additional expenditure of six millions, on their avowed principles of construction, would be followed by a considerable extension of sewers and drains of deposit.

The three millions would leave myriads of cesspools untouched.

Six millions more would extend the depositing sewers and drains.

Taking the data of the average of estimates in detail on plans laid down by their own officers for the drainage of all the houses in the ill-conditioned districts of the metropolis, considering the expense at which such works have actually been accomplished in blocks of houses there, the drainage of such houses in the metropolis with self-cleansing drains might be effected for a sum of about 600,000*l.* But allowing for the larger houses and more complete arrangements of the opulent districts, and the increased prices of materials, the estimates may afford to be doubled.

By the improved means, and with such a reduced expenditure, that which according to the independent testimony of

The good effected in pro-

vincial towns may be effected in the drainage of the metropolis.

Local Boards has been accomplished in provincial towns, may be effected for the whole of the metropolis, and a system of drainage and sewerage constructed which will be self-cleansing from one extremity to the other.

With greater force, and certainty, and rapidity than in the provincial towns, all refuse may be removed from beneath the site at a rate estimated at about two to three miles an hour, or before it can have advanced to any stage of decomposition. The effect of the permeable capillary drains laid down and recently completed under the Public Health Act in the city of Salisbury, is reported to be to lower the water-bed under the sites of houses full six feet. Similar advantages have been secured to other towns, and the effect of the like measures on the low-lying districts of the metropolis would be to do more than any projected main drainage alone; and particularly to be adequate to the elevation of the whole area, as if it were raised and placed in a less damp condition than the surrounding uplands. The total annual expense of the improved self-cleansing house and main and permeable drains, together, need be little more than half the average annual expense of cleansing and maintaining existing brick depositing drains, or of cleansing the existing cesspools; whereas, the projected extension of the system of depositing sewers must largely aggravate existing expenses.

Metropolitan Commissioners have not put themselves into possession of the experience afforded by their own works.

From such facts as before adduced it may be stated, with deference, that the present Sewers Commissioners have not put themselves in possession of the experience arising within their own districts.

The consulting engineers of the Sewers Commission were both members of the Health of Towns Commission, and signed the Reports, although they have altogether abandoned the principles then established by the Commission.

The views of your Honourable Board are founded on the expression of conclusions derived from the experience of witnesses of special qualifications, and the best practice to be found, while it is not known that either of the consulting engineers of the Sewers Commission have ever drained a town or even a single house. They were both, however, Commissioners of Inquiry into the Means of improving the Health of Towns, and in the report which they signed, they express in the following terms their conclusions from the testimony of competent practical witnesses;—terms which your Honourable Board adopted, and have always acted upon:—

The principles of that important Commission:
I. Proper water supply for drainage purposes.
II. Sewers of deposit condemned.

"Evidence," say the Commissioners, "has been produced before us, demonstrating that drains, where in other respects properly constructed, would confer little comparative benefit if no provision be made for the introduction of supplies of water sufficient to cleanse them. Instances are adduced where such drains have only extended existing evils.

"In districts in which both house and main drains exist, or are in course of extension, on an imperfect system, we have received strong evidence, showing that as these sewers and drains are so formed as to allow decomposing refuse to accumulate, and to permit the escape of emanations into the streets or houses, the inhabitants do not derive a benefit in proportion to the expense incurred."

The Commissioners then adduce the evidence of architects and builders to show the evil effects that will ensue unless the connexion of the internal works for a complete house drainage, and the works of external main drainage, be made necessary and component parts of an efficient measure.

III. Public sewerage and drainage of houses to be parts of the same system.

"The medical witnesses have brought before us facts in support of their strongly urged and unanimous opinion, that no population can be healthy which live amid cesspools, or upon a soil permeated by decomposing animal or vegetable refuse giving off impurities to the air in houses and streets."

IV. Cesspools and the retention of dead organic refuse utterly condemned.

They state the necessity of preventing all accumulations of stagnant refuse in or near houses, and of substituting a system of house drainage and cleansing aided by the introduction of better supplies of water into the houses. They have brought forward instances where the main drains and sewers were tolerably well formed, and subordinate or house drains attached, but where, from the want of properly directed supplies of water, both house drains and sewers only acted as extended cesspools.

V. Prevention of stagnation of all refuse in or near houses.

The Commissioners assigned as general causes of the failure of local works, the want of a competent authority to communicate information to Local Boards, and of properly qualified local officers.

VI. Necessity of a competent superintending authority for the prevention of failure in local works.

In another part of the report the Commissioners say,

"The same witnesses state, with reference to house drainage, that a saving may be effected of from one half to one third of the existing charges by the substitution of impermeable tube tile drains of a superior construction for the common brick drains, which allow the decomposing liquid refuse to permeate through the foundations.

VII. Recommend pipe drains instead of brick drains.

"Other competent witnesses state that in many cases the inconvenience of carrying the house drains under the front rooms of houses and across wide streets may be avoided, and the whole expense be greatly reduced, by a better arrangement, by leading them into small barrel drains carried along the back of the tenements."

VIII. And combined back drainage where convenient, as better and cheaper than separate drainage.

Upon the above principles the Public Health Act, and to a great extent the improved legislation as to metropolitan sewers, were based. However these principles may have been abandoned by others, they have been always adhered to by your Honourable Board, and experience has strengthened the proof of their correctness.

These principles have been adhered to by the General Board.

These opinions have also been fully verified within the metropolis itself, and corroborated more completely by the subsequent experience of which that attested by the returns of the several Local Boards to Lord Palmerston forms only a part, though, as respects the combination of the works of water supply, a principal part.

I believe that on the formation of the second Sewers Commission, composed chiefly of engineers, their then frequent chairman, Sir John Burgoyne, requested that a

member of the Board would meet them, and offer suggestions and discuss the course they should take.

It was at the time, however, deemed the less important, from the fact of the two Commissioners, Mr. Robert Stephenson and Sir William Cubitt, who had been engaged in the Commission of Inquiry into the Means of improving the Health of Towns, having agreed not only in the terms above quoted, but in conclusions for the union of house drainage with main drainage, for the combination of the works of water supply with the works of drainage to effect their systematic and self cleansing action, and for previous surveys in detail by means of which house as well as main drainage works might be laid down, and the repetition of the previous waste might be prevented.

Health of Towns Commission recommended proper surveys before designing of drainage works. The consulting engineers of the Metropolitan Commission of Sewers have abandoned their former views on surveys also.

It is a matter of regret that the same engineers are now in public opposition to the same principles and conclusions followed out in the Public Health Act, from the reports to which their hands and seals are attached.

It is due to notice the character of this opposition.

Your Honourable Board, in the minutes of instructions to Local Boards, had stated in the following terms your opinion on the advantages of the abolition of the labour of cleansing sewers as well as cesspools.

Impropriety and danger of employment in cleansing filth from sewers by manual labour.

"There are some descriptions of labour which it is improper for human beings to perform, and which ought to be forbidden, as being false in principle and belonging to a low state of art, and as being ignorant or interested excuses for the avoidance of the trouble and expense of practicable and efficient substitutes. Putting men to crawl or creep through channels filled with foul ordure, and to breathe noxious gases, is one example of such labour. Putting children to crawl through channels filled with soot to cleanse them, is another.

"Instances occur of the death of men from the mephitic vapours encountered in this disgusting labour, which are made known to the public; but instances are numerous which are not heard of where men are rescued in a state of insensibility, and sustain severe and permanent injuries.

"When the survey of the condition of the existing sewers in the metropolis, called the subterranean survey, had been determined upon, the members of the Board urged that special precautions should for all such future labour be taken under the guidance of a competent medical officer, for the protection of the men employed; but this was opposed by some of the old Commissioners on the ground of expense and as wholly unnecessary, and lives were actually lost which the precautions recommended would certainly have saved.

"It would be better that sewers of deposit in their frequent condition should be required to be opened to the surface, as house drains of deposit are, for cleansing, rather than that it should be permitted to continue the practice of sending men to crawl up them amidst foul ordure, to the certain injury of their health, and at the hazard of their lives."

The following is an extract from a report of the discussion on a paper read by Mr. Robert Rawlinson at the institute of civil engineers. He alluded to these opinions, and is said to have observed, as follows: —

" Better," he said, " that a street should be ripped up from end to end each year and cleansed from the surface than send men in to cleanse such sewers, where they were often struck down dead, as if they had taken poison."

Fatal consequences of men being so employed.

Mr. Robert Stephenson: " The Strand, Mr Rawlinson?" " Yes," replied Mr. Rawlinson. " I would rather break up the Strand than be the cause of one death so terrible. But there is no need to break up any street, as the practicability of self cleansing sewers has been abundantly demonstrated."

The following is the report of Mr. Stephenson's reply :— " Mr. Robert Stephenson said that when he first joined the Sewers Commission he fancied that he understood the subject, but the mass of communications constantly received there was so confusing that at length he resolved to judge by personal inspection, and he had spent much time in visiting the different localities and seeing the sewers for himself. As to pipes he would not touch one. He hated the very name of them, and felt inclined never to mention the word again. Mr. Rawlinson had stated that he fully expected to see the legislature ultimately pass an Act to forbid men going into sewers just as they had already forbidden boys going up chimneys. Now he thought that there was no comparing the two subjects. In the one instance persons were prevented from making boys go up chimneys, whereas in the other case men, who voluntarily followed the occupation, were free agents, and were not compelled by any one to go into the sewers.

Mr. Stephenson's unreasonable hostility to pipes, which the Chairman of the Metropolitan Commissioners of Sewers informs Lord Palmerston are to be used more extensively n future.

" Besides there were numerous callings rendered necessary by the wants of society which were injurious to health, and far more injurious it should be remembered than going down into the sewers, and which it would be folly to suggest should be forbidden by statutory enactment. The danger, moreover, might be in most instances overcome or avoided by engineers by means of ventilation, &c.

Defends sending men into depositing sewers to take out the refuse.

" He next called attention to the failure of pipes in the St. Giles' district, quoting a report thereon to the Sewers Commission, signed by their secretary Mr. Woolrych, and proceeded to point out how inappropriate and ineffectual pipe drainage would be in Bermondsey, for example, where the sewers were below high-water mark, and were stopped sixteen hours out of the twenty-four.

Refers to Church-lane, St. Giles', as a fair specimen of pipe drainage.

" He would not in fact use pipes, for they did not in fact afford any facility for repair. No sewers ought to be constructed that men could not go up, to inspect and discover at once the spot where any cause of stoppage or other source of failure existed.

Reiterates his objections.

Says that the greater velocity in small pipes than in sewers of greater size is a delusion and a fallacy.

"No fallacy was greater than the delusion that the velocity was greater in small pipes than in sewers of greater size."

Before the Committee of the House of Commons on the great London Drainage Bill the other consulting engineer of the Metropolitan Sewers Commission, Sir William Cubitt, was asked.

This dictum has no reference to facts.

Evidence of Sir William Cubitt on the great London Drainage Bill.

"3459. It has been stated here that the sewers that have been constructed are of too large a size; do you consider that the sewers that are constructed for the city, or the sewers constructed by the Metropolitan Commissioners of Sewers, are too large?—I never knew one too large yet; because I begin with this, that every sewer under a main street or public carriage way ought to be sufficiently large for a man to go in without any discomfort to rake it out and repair it.

Never knew a sewer too large.

Sewer to have flat bottoms.

"All you want of a sewer is to have a flat bottom of about nine or ten inches made, that a man can step with his feet and work in comfort, which he cannot do in those circular sewers."

In respect to the measure proposed by Sir William Cubitt in mitigation of this system of sewers of deposit, and before referred to, namely that every sewer should be ventilated "as the upcast shafts of coal mines are kept ventilated by "the action of fire by means of 500 shafts or tall chimneys in "various places," it is to be observed that the expense of such shafts can scarcely be estimated at less than an additional half million; but the plan proposed had been already tried; it was examined, and is reported to have entirely failed. In a report of your Honourable Board on combined works of water supply and drainage application to the Metropolis, it is stated:—

Sewers of London to be ventilated by 500 shafts.

On ventilation of sewers.

"The system of trapping," to prevent the escape of noxious effluvia from sewers of deposit, "having failed, other plans have been proposed with a view to the ventilation of large sewers. The expedient of erecting chimney shafts with furnaces to draw out the foul gases has been tried, for example, at Paris and Antwerp.

"Sewers have been partially ventilated by this means, but some of these gases being heavier than atmospheric air, have again descended and spread offensive odours over wide districts. At Antwerp it has been observed that though in certain states of the weather no offensive odour could be perceived, yet, whenever any fog hung over the city, the diffusion of noxious gas was rendered disagreeably sensible.

"In London, the steam jet has been tried, and, like the chimney shaft, it has been found partially to discharge the gases from sewers; but by frequent renewal of the air in contact with refuse in rapid decay, it is doubtful whether the result of this experiment was not a far more quick and copious diffusion of foul and dangerous gases which, though drawn from the sewer and discharged into the surrounding

atmosphere, were not changed to a condition of salubrity. Upon the whole, these operations have not realized their promises."

On a review of the whole evidence, it appears that there is no true remedy for the evils in question, but that which prevents the accumulation of refuse matter, by providing for its immediate and rapid removal.

As to surveys. The principle of the Health of Towns Commission and the General Board and the practice of the Metropolitan Commission of Sewers.

The Commissioners for inquiring into the means of improving the health of towns, found one of the chief causes of the former waste and the failures of work arose from the want of a properly executed survey, and they state that "in order to obtain the general confidence of the inhabitants in the correctness of the surveys and levels thus permanently marked, the work should be conducted under the superintendence of some disinterested authority independent of all local conflicting interests." In p. 16 of their second report, which bears the signature of Mr. Robert Stephenson, as well as Sir William Cubitt, they state:

"We therefore recommend that, before the adoption of any general measure for drainage, a plan and survey upon a proper scale, *including all necessary details*, be obtained and submitted for approval to a competent authority."

They also, in speaking of the metropolis, state, p. 72.,—

"The existence of these evils may, in a great degree, be "traced to the absence of a proper survey, such as we have "previously recommended as a necessary preliminary for "efficient drainage. No survey has yet been made of the "metropolis, and it appears to us that such a guide is even "especially essential in the large district comprised within "the jurisdiction of the Metropolitan Commission of Sewers."

They also show what they considered the necessary details to be provided for, by stating the nature of the works which should be under a public local administrative body, having the special charge and direction of all the works required for sanitary purposes, but that the Crown possess a general power of supervision. They state, "In the necessity and the principles of provisions giving such a power to the local authorities to compel the drainage of all streets, we fully concur, but we consider it would be an important improvement if the work were executed by the authorities themselves, instead of being divided among several different persons. Each owner or occupier must make his separate bargain with different workmen, and although they may perform the work under the direction of a public officer, and are required to do it to his satisfaction, yet they cannot execute it either so cheaply or efficiently as it would be done by an experienced workman acting under the constant supervision and control of a responsible and competent officer.

"We have received the statements of several witnesses of experience giving instances of the defective formation of

house drains, and the nuisance arising from them, where the works have been executed separately by a common bricklayer employed by each owner or occupier, independently of any general or systematic superintendence. Instances of the operation of the present practice occur frequently in the metropolis. Persons of experience have stated their opinion the necessity as well as the economy of placing the house drainage under one common management with the main drainage, as properly forming part of one combined system.

"The practice which appears to obtain extensively in large towns for the working men to build their own houses, and their general inattention to the necessity of house drains and their careful construction, are submitted as additional reasons for placing the minor branches of house drainage (which all the testimony on the subject proves may become the source of a foul nuisance if not executed with due efficiency) under one and the same jurisdiction and management with the main drainage."

An example in which the General Board proceeded on the above principles as embodied in the Public Health Act, and were obstructed and opposed by one of those who, as a Commissioner for inquiring into the Health of Towns, had signed the above, and is now one of the consulting engineers of the Metropolitan Commission of Sewers.

In the exercise of this duty under the Public Health Act, on an application for a sanction of the loan of money for some works, your Honourable Board objected to the want of proper security against waste, that is to say, with the details such as the Commission referred to have adjudged to be necessary. Upon the reports of your inspectors, you objected to the formation of four acres of open sewer reservoir in the immediate vicinity of the town, and required, before giving your consent, that the outlay should be considerably reduced.

The engineer projecting the works appealed to Mr. Robert Stephenson against the requirements of the Board. The latter expresses his view in the following terms:—

"With respect to the survey showing the buildings of the town, I cannot conceive it as of preliminary or immediate necessity. The general scheme certainly does not require it.

"Something of the kind was, if I recollect rightly, suggested for the guidance of the Metropolitan Sewers, but has never gone on as a general measure beyond a block plan similar to what has been prepared for Leicester; and I have all along considered even that block plan was not absolutely necessary for determining the leading features of the drainage of London. There cannot be a doubt that these minute surveys and details in the commencement are attended with much expense, and often seriously incumber very useful improvements."

Advantages of adherence to the principle of a proper survey as the basis of efficient and economical works.

That the provision of proper surveys incumbers extravagant and unnecessary outlays is proveable in this particular instance; that the expense of detailed surveys in the first instance is a means to economize is now demonstrated in a large number of others. By means of this precaution, examples have been achieved in nearly all the towns under the Public Health

Act, where it has been observed, of contracts taken and works executed with no other deviations from the original estimates than the late variations in the prices of labour and materials.

If what the consulting engineer has stated be correct, the Metropolitan Sewers Commission must have abandoned all regular proceedings, with the insertion of details, required as securities for efficiency in the most important and expensive portion of town drainage works, namely, those for the drainage of houses. This abandonment, whilst it is prejudicial to the most important sanitary improvement, and detrimental to owners as well as occupiers, is conducive to the interests of the contractors.

Abandonment of the details of the survey must entail a greatloss upon owners and occupiers of property.

Now, from what is known of the expenses of the separate and unsystematic execution of private house drainage works, it will be found, on inquiry, that the dereliction of the duty intended by the Act in this respect, will have subjected the householders to greatly increased expenses for works to accomplish the objects of those executed under the Public Health Act, by means of private improvement rates. It will probably be found that the owners of nearly 27,000 houses which have been drained with pipe drains, have been put to an unnecessary expense of upwards of £50,000 in the aggregate.

Having extended my remarks to so great a length, I have only to submit most respectfully to your Honourable Board, that at least some of the observations I have made may, in your judgment, be deemed of sufficient importance to be brought under the notice of Lord Palmerston, to whom the reports upon which it has been my duty to remark, have been already forwarded for his consideration.

I have, &c.

William Lee,

Superintending Inspector.

To the General Board of Health.

&c. &c. &c.

T. W. Rammell, Esq., to the General Board of Health.

4, Trafalgar Square, April 8, 1854.

My Lord and Gentlemen,

I have received a copy of a pamphlet, by Mr. J. W. Bazalgette, entitled "A Report upon the Drainage and "Water Supply of Rugby, Sandgate, Tottenham, St. "Thomas (Exeter), and Barnard Castle," addressed to the Metropolitan Commissioners of Sewers, and published by their authority, which has been forwarded to me by your secretary, accompanied by a letter, calling for my remarks thereon.

Mr. Bazalgette's Report to the Metropolitan Commissioners of Sewers.

In compliance with your wishes, I have attentively perused this pamphlet, and in every page of it have found passages which might challenge remark; but, in now addressing you upon the subject, I consider that I shall sufficiently consult the object with which you were pleased to direct my attention to it, if I confine my observations entirely to the two cases of Rugby and Sandgate, in which the works of drainage and water supply, so reported upon by Mr. Bazalgette, were designed by me, and to their bearing upon the general question.

Origin of his inquiries.

Before entering upon the details of the subject, I may be permitted to remark upon the circumstances under which Mr. Bazalgette was called upon by the Metropolitan Commissioners of Sewers to institute the inquiries upon which this report is based. It was in consequence of the receipt by the Metropolitan Commissioners of Sewers of copies of certain reports from the Local Boards of Health in the places named, showing the satisfactory operation of the new improvement works in their respective districts, which reports had been forwarded to them by direction of Lord Palmerston, that that body directed their engineer, Mr. Bazalgette, to visit those towns and places, and to report on the subject of pipe drainage therein, "for the information of the Commission." Upon the receipt of these instructions, Mr. Bazalgette states, that "he embraced the earliest opportunities his "official duties enabled him to take to visit the five places "named," having previously written in each case to the clerk of the Local Board of Health, announcing his intention of visiting the district, in order to obtain such information on the working of pipe drainage as would enable the Commissioners "to give the subject their fullest consideration." Mr. Bazalgette's first notice of this kind (namely, that in the case of Rugby) was issued on the 29th December, and announced his visit for the 4th January. The other four places were visited at different times in the course of the ensuing six weeks; and, on the 13th of February, Mr. Bazalgette sent in his report, upon the authority of which the Metropolitan Commissioners of Sewers are expected to cast aside, as being unworthy of attention, the evidence favourable to the operation of tubular drainage contained in the before-mentioned reports to the Secretary of State from the Local Board's question; reports containing the result of their experience during some considerable time.

Hasty and superficial manner in which they were conducted.

Mr. Bazalgette, it is true, admits at the outset the hasty and superficial manner in which, in his anxiety for the speedy performance of his mission, he has been obliged to pursue his inquiries. "The shortness of time which, I was enabled "to devote to each place did not admit," he says, "of my "making those general inquiries of the inhabitants which I "should otherwise have done;" and then, after making the bold assertion that "as pipe sewers do not admit of satis-

factory inspection without taking them up again," he states that his information was "necessarily" collected from the clerks and surveyors to the Local Boards.

As to means of inspecting pipe sewers.

As to the notion that pipe sewers cannot be inspected without taking them up, I will undertake to say, that Mr. Bazalgette would have been disabused of it if he had devoted a little time to actual experiments upon the works themselves, at the places visited by him; and, as it is, I believe I shall most satisfactorily prove its fallacy in the sequel of the present communication. I may be permitted to observe, by the way, that Mr. Bazalgette's personal observations (if he made any at all), having been so hasty and restricted, if instead of confining his inquiries upon the subject to "the clerks and surveyors to the Local Boards," he had also addressed himself to the engineers who had designed the works, he would (to say nothing of what may be considered due to professional courtesy) have acquired some information upon points of importance towards the object of his researches, of which he appears now to be ignorant, and have avoided many errors of statement, which, unfortunately for the value of his labours, he has committed.

Rugby.

Mr. Bazalgette's visit Rugby.

In the case of Rugby, I understand that Mr. Bazalgette having written to Mr. Wratislaw, the clerk to the Board, announcing his intention to visit that town on the 4th of January, did so visit it on the 5th, when he did not see Mr. Wratislaw, that gentleman having an engagement which required his presence elsewhere. Mr. Bazalgette, however, called upon Mr. Phillips, the surveyor to the Local Board, at his house, to which he was confined by indisposition; and, in the course of a few hours' conversation, obtained the information upon which his report is based, and for which he thus expresses his obligations at the conclusion: "I visited "this town on the 5th of January 1854, and am indebted "for the foregoing information to Mr. Phillips, the sur- "veyor to the Local Board of Health, who appears to have "devoted great attention to the subject, and to have used "every effort to make the works under his charge success- "ful in their operation."

Mr. Phillips did not accompany Mr. Bazalgette to any part of the works, and states that he is not aware that he visited them at all.

I now proceed to examine some of Mr. Bazalgette's statements, taking them in the order in which they occur.

Depth and dimensions of sewers.

"The public sewers are laid at an average depth of about 8 feet; they vary from 6 to 22 inches in diameter."

The average depth of the public sewers is 10 feet 6 inches; and two main lines are in parts, one 21 and the other 28 feet deep. The sizes of public sewers vary from 6 to 20 inches.

"The inclinations of public sewers are upon the average "remarkably favourable, being about 1 in 50 or 60. The "best inclination is 1 in 19, and the worst 1 in 324."

Their inclination not "remarkably favourable."

As to the generally favourable situation of the town, although undoubtedly it is considerably elevated above the level of the Avon, it is placed upon a flat table area which does not afford favourable inclinations for drainage. The ruling gradient in the town is 1 in 240, and there are gradients as flat as 1 in 320. Two miles of sewer are at the former gradient, being nearly all of the smaller sized pipes, and at the upper extremities of the system. On the other hand, there are two miles 678 yards at gradients of 1 in 60 and under, but these are wholly confined to main outfall pipes, where the flow of sewage being large, the steepness of the fall is of comparatively little importance.

Road and surface drainage.

"The road drainage is carried off mainly by the old brick "sewers originally constructed for that purpose, but there "have been about sixteen road gullies connected with several "of the new branch sewers, and the outfall of the old surface "drains is connected with the new pipe sewers near the "outfall of the latter."

Carried off by pipe sewers.

The new system was laid out to receive the surface waters as well as the house drainage of the old district. In the first instance, some lengths of the old brick drains were temporarily retained, and received the surface waters in the parts in which they existed; but they have been so used only as long as house drainage also passed into them, and gradually, as the house connexions have been made with the pipe sewers instead of with the brick drains, the surface waters have also been passed into the former, and the latter dispensed with.

The parts of the town in which short lengths of the old brick sewers still receive surface waters, are principally in North-street, Pindar's-lane, Chapel-street, and Pennington-street. In a word, at the present moment, so far "from the outfall of the old surface drains" being "connected with the new pipe sewers near the outfall of the latter," the whole of the surface waters of the town area are now received into the pipe sewers, either directly or through the intermediary of the few remaining portions of brick sewers, within the limits of the town itself; the three nearest points to the outfall at which surface waters in any quantity are passed into the system of pipe drainage, being respectively at distances of 1 mile 500 yards, 1 mile and three quarters of a mile from the outfall.

Branch sewer in Warwick-street, state of.

"One of the branch sewers, which is laid at an inclination of 1 in 200, now receives as many as five gullies. This branch has not been opened for some months; and as the condition of pipe sewers can only be fully ascertained by taking up the whole length of sewer (because the depth of deposit in them varies considerably at different periods), it

is impossible to say what amount of deposit this sewer may now contain.

"Although in one respect it is advantageously circumstanced, receiving the drainage from a road subject only to a small amount of wear and tear, experience on this subject leads me to anticipate that no description of gully or trap will suffice to prevent the road drift whilst held in suspension in the water from being carried into the sewer, and, with no better inclination than that above-named, afterwards accumulating in it, and ultimately becoming a source of inconvenience and expense."

Proved to be quite clear.

The branch drain in Warwick-street must be the one here alluded to, though the gradient is 1 in 240, not 1 in 200. The five gullies in question have been in connexion with this drain almost from the commencement, and there has been no sign of stoppage or accumulation in it. Indeed Mr. Phillips informs me (and could also have informed Mr. Bazalgette if he had been desirous of the information), that he has reason to be satisfied that there is no deposit in this sewer; that he had occasion to open it at the bottom of its length, a short time since, to put in a house connexion, and found it perfectly clear, with about two inches of liquid running through it. The supposition that there are no means of testing the condition of a pipe sewer except by opening it up through its entire length, is a great mistake. To say nothing of other methods, as by examination wells, flushing, notwithstanding Mr. Bazalgette's apprehension to the contrary, does, when properly performed, afford a complete test. Mr. Phillips, speaking of his experience at Rugby, says that, upon the hose being introduced and playing into it, the pipe, if clean, rings like a bell for a considerable distance; moreover, that the rate and volume of the flow affords additional evidence to judge by; and that in the case of actual obstruction he has, upon flushing, invariably found the water back up through the house connexions, in which case, to avoid such inconvenience, he has had occasion to stop up the house connexions during the process of flushing, so long as the obstruction lasted.

Mr. Phillips' account of the satisfactory working of the system.

To resume, Mr. Phillips informs me, that with respect to the branch drain in Warwick-street, he is satisfied that it is free from deposit or accumulation whether of road drift or other matter. He also gives me some further information with regard to the working generally of the drainage works under his charge, which it may be satisfactory to the Board to learn. He states that during the whole period since the works have been opened (now more than two years) there have been in all twenty cases of stoppage in public drains, (two of which by the way were in brick sewers); and that of the stoppages in pipe sewers, the whole of them with one exception occurred in the smaller extremities of the system. With regard to the cost of remedying these stoppages,

he stated, that the only record he has on the subject is his "labour book," the cost of materials being almost *nil*, and that the gross amount for the two years has been 20*l.* 17*s.* 4*d.*

Twenty cases of stoppage since the commencement, two of which in brick sewers.

Most of the cases of stoppage in pipe sewers were incidental to the newness of the system, and have been effectually remedied by the relaying of some short lengths of pipe. In one instance a levelling instrument five feet long had been left in a pipe, and in another the pipe had not been properly cleared of sand when laid. In all the other cases the obstructions have been removed by means of the flushing hose, and in the course of a few minutes.

Cost of clearing and repairing.

The above is exclusive of a case of a main outfall line passing through the property of the North-western Railway Company, which was diverted into unusually deep ground at their request and for their convenience. Here two shafts sunk in, breaking the pipes beneath.

Permanent examination wells have since been constructed at these points, and although I mention this as having occurred since the works were finished, the cost should properly be considered as one of original outlay.

House drainage.

"Separate drainage for the houses has been generally "adopted in preference to combined back drainage, because "it was found that the latter system interfered considerably "with the rights of private property, and it was impossible "to get the owners of different properties to agree to the "united execution of combined works."

Combined and from the back.

Mr. Phillips informs me that back drainage has been generally adopted, and in combination, as a rule, with the smaller class of houses. He mentions to me several cases of groups of houses, as in Rider's Court one of 16, in Warwick Street one of 12, in Pindar's Lane one of 21, and in High Street two or three cases of small groups; and considers upon the whole that about two thirds of the houses in the town are back drained in groups varying from two or three each to 16 or 20.

Whether the experience of the operation of the system has been sufficient as a test of their suitability.

"The amount of drainage which has from time to time "been turned into these sewers is not yet sufficient in quan-"tity, nor has sufficient time yet elapsed to afford any "decided proof of their suitability."

Upon this it may be observed,—

1st. That these sewers now receive the whole of the surface drainage, and more than two thirds of the refuse drainage of the town, without giving any indication of being overcharged, and therefore as far as capacity is concerned may be said to have been satisfactorily tested.

2dly. As regards house drainage, Mr. Bazalgette's observation would lead to a very erroneous impression, namely that the difficulties of working a system of sewerage are increased in proportion as it comes into complete use, the fact being that the difficulties at first is in getting sewers, whether brick or

pipe, to work with an amount of sewage passing through them considerably less than that for which they were calculated.

3dly. That a system of sewerage which has worked satisfactorily in every part during a period of two years, may fairly be considered to have given decisive proof of its suitability to work equally satisfactorily under similar circumstances for any length of time, subject to durability of material.

Water required to insure the operation of the sewers,

" The surveyor to the Local Board attaches great importance to the existence of an abundance of water, and to the joints of the drain pipes being made water tight; and he attributes most of the stoppages which have occurred in house drains to defects in this latter particular, whereby the water soaks away through the joints, leaving the solid portions to deposit in the sewer or drain."

Undoubtedly an adequate and regular supply of water is necessary for the operation of sewers intended for the removal of solid refuse in suspension, but the quantity of water necessary for the efficient action of pipe drainage to this end, is very much less than that necessary to effect the removal of an equal quantity of refuse through brick sewers, being larger in dimensions. The water supply at Rugby for all purposes, and which is found sufficient to keep the system of drainage in action, is, according to Mr. Phillips' observations, 16 gallons per head of the population per diem, whilst that in London for private house consumption only is, according to the returns of the Metropolitan Water Companies, 18¼ gallons per head per diem, and this is notoriously not sufficient to cleanse the sewers.

not excessive in quantity.

Joints of pipes should be water tight.

With regard to the joints of drain pipes being made water tight, that also is a necessary condition to their operation as conduits for fluids of any sort, but there is no practical difficulty in accomplishing this requirement to the fullest extent. Mr. Phillips informs me that there has been no case of a public sewer being stopped, either from leakage in itself or on account of solid matter deposited in it through the occurrence of leakage in a private drain. With respect to the stoppages in private drains, which have been but few in number, they have been for the most part clearly attributable to foreign matters introduced into them, and which have been discovered and removed before passing through such private drains into the public sewers.

Water supply

" The water supply is obtained from the drainage of a gravel bed about a mile from the town. The present quantity supplied has however been found insufficient for the requirements of the town, and additional channels for collecting water from a more extended area are about to be constructed. The water at present collected is conveyed by stoneware pipes, seven inches in diameter, into a reservoir capable of containing about 200,000 gallons. An engine of ten horse power is employed to raise it to a

" height of 110 feet into an upper reservoir, capable of " holding 50,000 gallons. But a duplicate engine is still " required, and will have to be provided, to secure the " certainty of the water supply at all times."

has not been "insufficient."

The unavoidable inference from this statement would be that the plan of water supply adopted in this place had been found inadequate to the purpose, and that additional works had become necessary. This, however, is the reverse of the truth. The plan of water supply at Rugby is one of underground collection within a flat table area, estimated, if all of it were called into requisition, to afford a supply much larger than could possibly be required. Only a small portion of the scheme (about one tenth of the whole) has as yet been constructed and has hitherto been found (not "insufficient" but) "sufficient for the requirements of the town."

Mr. Phillips informs me, that they have never been short of water in the dryest times. The quantity of water now supplied is about 95,000 gallons in a day, which being distributed amongst 850 houses, including the schools and large boarding-houses, and comprising a gross population of 6,000, would show a daily consumption after the rate of nearly 16 gallons per head.

Extension of the system.

Although the portion of the entire scheme of works in the first instance laid down, has proved sufficient for all requirements in the gradual extension of the system to the district, the Local Board were from the first aware of the necessity for laying down additional portions of the works of collection to meet the full requirements of the town when all the houses should be under supply, and in its probable extension. These works would have been undertaken earlier but for some difficulties which occurred in dealing with proprietors of land; they are now however about to be commenced, the contracts being actually let. By means of such gradual extensions of the system, the Local Board will have it in their power to provide for all possible future requirements of the place. I may add, that the soundness of the principle upon which this plan of underground collection and storage was based, and which to some extent was experimental, has been most satisfactorily established by the experience already had of it.

Duplicate engine part of original plan of works, and actually in its place.

With regard to the duplicate engine which Mr. Bazalgette states "is still required and will have to be provided," such duplicate engine formed part of the original plan of works, and the space to receive it was provided in the engine-house when building. Furthermore, the said duplicate engine was actually fixed in its place, when Mr. Bazalgette was at Rugby on his tour of inspection, and if he had visited the works he must have seen it. Each engine is adequate to furnish the entire daily supply.

For the sake of accuracy it may be added, that the collecting pipes are of common earthenware, not stoneware;

that the size of the main lines is 11 inches high by 9 inches wide, instead of 7 inches in diameter; and that the reservoir is of capacity to hold 125,000 gallons, and not "about 200,000 gallons." Other errors of statements.

"The water is laid on upon the principle of 'constant "'supply,' and has been exhausted three or four times "through the carelessness of persons leaving the taps open. "A foreman goes round every morning to examine the con- "dition of water-taps and drain inlets, and this strict super- "vision is found of the utmost importance to the successful "operation of these works." Water in "constant supply"

It is true that the supply in the tank at the top of the water tower has been once or twice run out during the night, but mainly I believe, owing to an ornamental fountain having been left playing instead of being stopped, contrary to express agreement with the board. The supply, that in the reservoir and the system generally, has never been exhausted from the causes described, or any other whatever. With regard to the statement about the foreman going round every morning to examine the taps, &c., this is almost wholly imaginary. Mr. Phillips informs me, that occasionally when the foreman has nothing to do, he directs him to examine the taps and waterclosets in a street of houses, and that probably two or three streets are thus examined in the course of a week. has never been exhausted.

"The cost of private works, including the laying on of "water, and destruction of cesspools, has raised from 5*l.* to "50*l.* per house, according to the length of sewer and drain "required to be constructed by the owner. Now, assuming "the average to have been only 8*l.* per house, the cost of "these works would amount to 8,800*l.* so that the drainage "and water supply of the town, when completed, would upon "this supposition amount to somewhere about 25,000*l.*" Cost of private works.

Mr. Phillips informs me, that the whole cost of private improvement works, drainage, and water supply, including water-closet, in the smaller class of houses, and where back drainage is adopted, has been about 4*l.* a house. It is in these cases that lowness of cost is of prime importance. In the case of the school and the large boarding-houses, some containing from sixty to eighty inmates, it is very probable that the cost of private works may have even exceeded 50*l.* Mr. Bazalgette states in a note, "on the 21st ultimo, I "applied to the surveyor for more definite information "in this and some other points, but I have received no "answer to my letter." Mr. Phillips informs me, and begs me to state, that he received no letter of the kind from Mr. Bazalgette.

But, whatever the amount of cost of private works, upon what pretence or precedent does Mr. Bazalgette mix up this description of expenditure with that for public works, in order to swell the gross sum of outlay exhibited? Is this the

mode of calculation in London, when we are told of an outlay of 3,000,000*l.* in works of drainage? Is this the calculation of the London or other water companies when they estimate the cost of their works?

Rating for public improvement.

I will not follow Mr. Bazalgette in his confused investigations of "rateable value and rates," including reference to the peculiar hardship in the case of cows and horses. I will content myself with the broad fact that the inhabitants of Rugby are now in possession of works of drainage and water supply, the cost of which will be defrayed in thirty years, by an annual rating in the interval of 10*d.* in the £; in addition to a water rate of 4*d.* in the £, which will be permanent. Thus a £5 house is provided with efficient drainage and water supply for an annual payment of 5*s.* 10*d*; a £10 house for 11*s.* 8*d.* and those of higher rateable value in proportion, of which charge two thirds will cease after thirty annual payments.

Price of pottery drain pipes, &c.

Mr. Bazalgette gives in an appendix a "schedule of the prices for pottery drain pipes" in the Rugby works, and observes "The prices were much lower when these works were executed than at the present time," a fact which the Metropolitan Commissioners of Sewers were probably already aware of; as also, that within the same period the cost of bricks and brick sewers has increased in even a greater ratio than that of stoneware drain pipes.

Sandgate.

Mr. Bazalgette's visit to Sandgate.

Mr. Bazalgette commences his report on Sandgate by stating that it is "remarkably healthy and pretty village." This description, as far as remarkable healthiness goes, did not always apply. The evidence adduced before me at the preliminary inquiry in 1849 established the fact, that the inhabitants of this retired and almost rural village were subject to an undue amount of sickness; that according to Dr. Donally "Typhus and low fever frequently prevailed, and sometimes extensively;" and that diarrhœa was much complained of in hot weather; and finally it appeared that these visitations of sickness were clearly attributable to the filthy condition of the place. It is satisfactory, however, to learn, from the letter of Mr. Pledge, the clerk to the Local Board of Health, to Lord Palmerston (dated November 26, 1853), that "the operations of the Board in carrying out the "important provisions of the Public Health Act, have been "followed by a decided improvement in the health of the "district."

The place has not always been "remarkably healthy."

Mr. Bazalgette's visit to Sandgate was not of any lengthened duration, though a few hours longer, I believe, than the visit with which he favoured the Rugby district. He arrived in the evening of one day, and departed early the next afternoon. In the interval, as he states, "He was indebted to "Mr. Pledge, the clerk to the Local Board, and Mr. Harman,

" their surveyor, for having so readily placed him in possession " of the facts which he has the honour of reporting to the Metro- " politan Commissioners of Sewers for their information."

I now proceed, as in the case of Rugby, to examine some of Mr. Bazalgette's statements in respect to the works of drainage and water supply in this place.

" From its position, resting upon a sea beach shingle, it " required but little artificial drainage. Nature has provided " the most perfect sub-soil drainage, and all liquids percolate " rapidly through the shingle into the sea. The present " surface drainage has long existed in the shape of a few " covered drains and open cuts, which admit of the rapid " discharge of surface waters to the beach." Its natural drainage facilities.

I will not dispute the theories of health and cleanliness upon which Mr. Bazalgette is led to the conclusion, that the percolation of liquid refuse through a shingly sub-soil leaves little or nothing to be desired. I will only observe that in the case of Sandgate, the noxious atmosphere generated from the beach, so impregnated with filthy refuse, was stated to be most offensive to the inhabitants and visitors, and was considered by the medical men to be prejudicial to health, inducing periodical diarrhœa and fever. Further, at the time of the inquiry in 1849, although a large portion of the town did not stand in need of sub-soil drainage, there were parts which did, parts in which the houses were subject to flooding by sub-soil waters. Moreover, notwithstanding the rapid discharge of surface waters through the " few covered drains and open cuts " which have so long existed and been deemed sufficient, parts of the town were stated to be liable to flooding.

" The public sewers and water supply were executed under the General Board of Health, by their inspector Mr. Rammell." Improvement works executed under Local Board of Health;

The works in question were executed under the Local Board of Health, for whom Mr. Rammell acted as engineer.

" These works are not designed or executed so as to be applicable to any considerable extension of the village." their extent;

The improvement works are applicable to the whole of the existing buildings in the district of the Local Board, and to any probable extension of the village within such district, with the exception, in respect of water supply, of some few houses already provided with water from other sources.

It may be proper here to give a few words in explanation of the position of the place, and in so doing, I will first adopt the general local description of Mr. Bazalgette. According to this description the village of Sandgate " stands mainly " upon a single road running parallel with and close to the " sea shore, at the foot of a range of hills which rise precipi- " tously from the sea, and prevent the extension of the houses applicable to whole existing and any probable extension of the village.

" excepting along the line of the shore." To this must be added, that part of the village including the Castle is within the jurisdiction of the local authorities of Folkestone, and not within that of the Sandgate Local Board.

The Improvement works of the Local Board at Sandgate have been designed and executed to serve all the houses now standing, or which may hereafter stand, within the building area under the jurisdiction of the Sandgate Local Board of Health as described by Mr. Bazalgette.

Number of houses drained.

" The surveyor to the Local Board informs me, that up to " the present time about 270 houses are drained into the " sewers."

Mr. Harman states that the total number of houses so drained is 194.

Separate drainage of houses

" Separate drainage for houses has been adopted in reference " to combined drainage, because it was found to be very diffi- " cult to get the owners of property to agree to carry out the " latter, and the system of draining the houses separately " was in general more satisfactory in the result."

has been the usual practice, and why?

Mr. Harman states, that separate drainage has been most usual, not, however, for the reasons stated, but because there are in this place very few blocks of houses to which the principle of combined drainage was applicable; but that wherever the principle could be, it has been acted upon, and that he is not aware of any case in which difficulties were raised against so doing by owners of property.

Sizes and inclinations of public sewers.

" The sizes of the public sewers vary from 6 'to 12' in diameter, and their inclinations from 1 in 6 to 1 in 320."

The prevailing gradient of the sewers throughout the district is 1 in 240. Of the whole length of sewer (one mile 585 yards) there are 672 yards at gradients between 1 in 6 and 1 in 34:—375 yards at gradients between 1 in 119 and 1 in 178; and 1298 yards at gradients varying from 1 in 237 to 1 in 320.

Alleged nuisance from ventilating pipes.

" About a year ago, three of the stack pipes from the roofs of houses were connected with the pipe sewers, in order to provide for the ventilation of the latter, as recommended by the engineer. One of these pipes caused a nuisance to the adjoining houses, and was afterwards trapped, whereby it ceased to act as a ventilator."

" Three new ventilating shafts have lately been carried up the sides of the houses in places not likely to create a nuisance, and the Local Board proposed shortly to construct four more of the same kind."

The nuisance described took place a year ago, before the relaying of a considerable portion of the sewers, a circumstance to be hereafter more particularly referred to. Mr. Harman states, that since then he has heard no complaints of smells from ventilating pipes; indeed, that there could be none, as the sewers when opened have always been found sweet and clean.

"Stoppages having occurred in the three eastern lengths of main line, about 766 yards were taken up and relaid about twelve months ago. The pipes, it is said, had not in the first instance been laid at sufficiently true inclinations; and the surveyor has not since observed more than 1½ inches of deposit in them."

Stoppages in three main lines

In the case of Sandgate, the improvement works, at the express desire of the Local Board, were executed under local superintendence, and of course without those guarantees which the appointment of a properly qualified clerk and inspectors of works by the engineer would have afforded, of the plans being accurately adhered to, and the works executed in a careful and substantial manner. Very shortly after the completion of the works, it was discovered that various errors had been committed in their execution; wide deviations from the gradients had been made, in some places to the extent of from 7 to 12 inches; and it is almost needless to state that in a system wherein the natural levels were so unfavourable, even smaller inaccuracies than these would be fatal to its working. But in addition to the errors in the gradients, the works had been carelessly executed in other respects, more particularly in the closing of the house junctions, which had been done with straw or other vegetable substances, materials which speedily gave way and admitted the shingle into the pipes.

in consequence of bad workmanship.

Immediately upon having reason to believe that errors of the above description had occurred, I caused the three main lines of drainage which first came into use to be thoroughly examined, and afterwards relaid accurately at the gradients set forth in the plans, and the house connexions to be properly closed. The cost of these additional works, amounting to £77 13*s.* 3*d.*, of course fell upon the contractor, through whose carelessness in the first instance they had become necessary.

Pipes taken up and relaid at the cost of the contractor

This occurred more than a twelvemonth before Mr. Bazalgette's visit, during the whole of which period the system had worked most satisfactorily.

have since worked satisfactorily.

With respect to the concluding passage in the extract above quoted from Mr. Bazalgette's report, "and the "surveyor has not since observed more than 1½ inches deposit "in them," I have the authority of Mr. Harman for stating that, if it is supposed to be based upon any information received from him, it is at variance with anything stated by him, and moreover that it is at variance with anything observed by him. Mr. Harman states that since the pipes have been properly laid, he has not observed more than "1½ inches depth of flow," not "deposit," in them.

Depth of flow through them.

"Just before the time of my visit, the surveyor to the Local Board had had occasion to open the remaining or fourth length of main line to connect a house drain with it, when he discovered that it also was stopped up.

Stoppage in fourth main line.

"It is here worthy of remark, that in this, as in most porous soils, the stoppage was not discovered until the surveyor had occasion to make a fresh connexion with a house drain, because the sewage from the four houses draining into this length of main sewage had filtered away through the joints of the pipes into the shingle, and had therefore not backed up into and flooded the houses. This is a strong indication that many similar obstructions may exist for years in pipe sewers under such circumstances without being discovered; the soil drainage in such cases saturates the ground just as much as if it were discharged into cesspools, and the sewers fail to perform the duty for which they were constructed, viz., the removal of the sewage.

"When I visited the works, the surveyor had excavated the ground down to the pipes, for a length of about 16 yards, to discover the position of this stoppage, but without success. A flushing pipe was then opened about 34 yards higher up the line of sewer, and water was turned into it by a hose from the reservoir, elevated about 85 feet above the level of the pipes; this stream of water was unable to force its way through the stoppage. During this operation I expressed my apprehension that the water would rise into basements of the adjoining houses if not immediately turned off; but, instead of doing so, as must have been the case in a retentive soil, it forced its way through the clay joints of the pipes into the shingle, and immediately drained away as the sewage from the houses had previously done.

"I left the cause and positions of this stoppage unascertained, with 16 yards of trench opened, and a further length of 34 yards of sewer to be opened and relaid should the workmen not be so fortunate as to hit upon it within a shorter length; so that, after deducting the 253 yards which have a fall of 1 in 15 to 1 in 25, it appears that out of the remaining aggregate lengths of main line, amounting to 1,256 yards, 816 yards or about two-thirds of the whole length have already once failed and been relaid."

Owing also to careless workmanship in the first instance.

This passage is rather a long one, but I prefer extracting it entire, in order to meet it with the answer which it calls for. It consists, as will be seen, of various assertions as of fact, and of inferences based upon such assertions as of fact; concluding with a vague expression of doubt, as to the exact situation and nature of the cause which gave rise to the whole occurrence; which doubt, if Mr. Bazalgette had made proper use of the information within his knowledge at the time of writing his report, would not have existed in his mind; and so the whole statement would have been almost unnecessary. It is of the more importance to insist upon this position, because I observe that Mr. Bazalgette bases a theory upon this supposed case of failure, which he uses in

the introductory part of his report, besides in the course of it, suggestively, to the disparagement of the works of pipe drainage in other cases than that of Sandgate.

The case of the fourth line of drainage at Sandgate is as follows: At the time the other three lines of sewers were relaid, this fourth line had not been called into use, with the exception that one house drained into it; and the surveyor who laid the other three lines was of opinion, after a casual inspection of it, that it was in good working order. The result however turned out otherwise, inasmuch as, when the house connexions came to be made with it, it was found to be blocked up, although the level was true; but whether this stoppage existed from the beginning, or occurred through subsequent filling in through house junctions, cannot now be ascertained.

Mr. Bazalgette's doubts on the subject not warranted, looking to the information within his knowledge.

Mr. Bazalgette, at the time of his visit, discovered the surveyor of the Local Board in the act of investigating the cause, or rather the precise situation, of this stoppage (for the cause was pretty well understood), and left the matter in uncertainty when he came away. But a week before Mr. Bazalgette wrote his report, he received a letter from the clerk to the Local Board, which fully explained the occurrence and its happy termination; information which, if he had made use of it in the text of his report, would have necessarily caused him to alter the character of the observations in which he has indulged. Mr. Bazalgette, however, instead of so using the materials thus furnished him, or even printing the letter itself, simply refers to it in a note, thus:

"On the 6th of February, I received a note from the "clerk of the Local Board of Health, expressing satis- "faction at having to inform me that this stoppage was "occasioned by the shingle having got into the pipe."

The satisfaction of the clerk to the Local Board at this discovery was, I submit, perfectly natural and easily accounted for, though Mr. Bazalgette does not appear to appreciate it. The stoppage in this drain was found to be attributable to the same description of careless workmanship in the first laying which had conduced to the temporary failure of the other three lines of sewers; the obstruction being discovered was quickly removed, and the pipe has since worked well.

Mr. Bazalgette in error as to the supposed leakage of pipes.

Mr. Bazalgette is in error as to the *rationale* of the manner in which the water escaped from the stopped pipe during the process of flushing, and the inference which he bases upon that view of the case is untenable. From what Mr. Harman has since told me, it appears that, when the flushing process was being performed which Mr. Bazalgette describes, the water did not flow away through the joints of the pipe, but partly through the junction hole, which had been stopped with straw, and partly along the

length of the pipe through the gravel which had got into the latter upon the rotting and giving way of the straw.

Mr. Harman's observations on this point.

As to the idea of the water filtering away through the joints of the pipes into the shingle, Mr. Harman expresses himself confidently to the contrary. He informs me that he has particularly watched the working of these joints, and that he considers that the internal action of water upon them has the effect of softening the clay, and rendering them tighter than before. He states further, that he has been in the habit occasionally of flushing out the sewers, observing the flow of water through them, and timing it with a watch. He had so flushed them a very short time previous to Mr. Bazalgette's visit, when he was convinced that the pipes of the three main lines were perfectly clear at all points. His reasons for believing that there is no leakage at the joints under the process is, that he has observed that the quantity of water coming out of the pipes on such occasions has been fairly equivalent to that which was turned into them.

And on the flushing of the pipes.

Mr. Harman has been in the habit of making careful observations of this kind, and has kept records of them, which I subjoin. He states that at any time he could find out the condition of a sewer in any length of it by flushing, in the course of half an hour or less, according to the distance from the outfall at which the operation took place.

He furnishes me with the following return of his experience of flushing the sewers at Sandgate:

"I have flushed the sewers about six times.* The ordinary times of flow to outfall, from the several points, have been as under:—

Torin's opening	5 minutes.
Bourne's opening	6 „
Flisher's opening	7 „
Bateman's opening	9 „
From stable opening	12 „
End of Back-lane	10 „
Marine Hotel	12 „
Chapel-street	15 „
Mr. Dawkin's gate	18 „
Mr. Thompson's villa	20 „

Number of stoppages in drains, public and private.

"About a dozen stoppages in pipe drains and in the minor branches of sewers were reported to me, and I am informed that they all arose from what are termed avoidable causes, such as the introduction of improper substances."

Mr. Harman informs me that there have been no stoppages in any of the drains which were relaid last year.

Since that period, however, there have been four cases of alteration and repair in portions of the public sewers which were not so relaid; at a total cost of 6*l.* 4*s.* 3*d.*, an expense

* On the 5th April Mr. Harman flushed the sewers again at my request, and reports them to be perfectly clear in all parts.

which ought properly to be added to the before-mentioned amount of 77*l.* 13*s.* 3*d.* for relaying the other three main lines, and charged against the contractor He states also that there have been in all thirteen cases of stoppage in private drains, repaired or removed at a total cost of 5*l.* 0*s.* 3*d.* In *eight* of the cases of private drains, the stoppage was owing to the introduction of improper substances. In four it was owing to the disarrangement of the pipes by the sinking of the earth, with which cesspools had been filled in; in one case partly to that cause and to excavations made by rats; and in one case to the pipe originally having been laid with an insufficient fall.

Their nature and cost of repair.

The following is a memorandum by Mr. Harman:

"Expense of altering and repairing public drains since commencement.

		£	s.	d.
1853, April.	Altering opposite Ship Inn -	0	12	6
	Altering Bateman's opening -	0	7	6
1854, Jan 7.	Opening drain at Flisher's opening	1	10	0
	Ditto at Bourne's opening -	0	10	0
21.	Altering drain at Wellington-terrace*	3	4	3
	Total -	£6	14	3

13 house drains stopped, cost cleansing £5. 0. 3.
In 1 found a clothes-peg.
In 1 a chisel.
In 1 (Mr. Coleman's), for want of sufficient fall.
In 1 a strap and rags, cleaned twice
In 3, from cesspools sinking.
In 1, ditto and from rats.
In 5, from allowing clothes and other matters to go through closets.

There was a short length of twelve-inch pipe laid in the beach at a depth of about nine feet, which when opened was found broken, and thicker pipes have since been substituted."

12-inch outfall pipe.

This was at the time of the relaying of the pipes immediately after their opening, previously spoken of at length. This pipe was probably broken by the carelessness of the workmen in the process of laying or in sinking to take it up.

Upon the whole, with all respect for the opinion of Mr. Bazalgette, I am inclined to hope that if this cannot be considered a very happy illustration of the successful working of pipe sewers, it cannot be truly described as a very unhappy one. I will not speculate upon the suggestions which that gentleman makes as to the probable advantages of cutting up the main line of pipe into shorter lengths, and in some instances of increasing it in size, many of which are wholly

Upon the whole not a very unhappy illustration of the working of pipe sewers.

* This was the case in hand at the time of Mr. Bazalgette's visit.

incompatible with the facts and necessities of the case, and some at variance with the known experience of pipe drainage.

Experience of the working of new brick drain not in the district of the Local Board.

I feel bound, however, before quitting the subject of the drainage of Sandgate, to refer to a portion of it within the district of the Folkstone local authorities, upon which Mr. Bazalgette says nothing, probably because he did not consider it would conveniently come within the scope or fulfil the intentions of his mission to do so, but which I think will be of importance when giving a "full consideration" to the question between tubular and brick sewer drainage.

The facts are simply these: the small portion of the village of Sandgate which is not within the district of the Local Board, has not been submitted to the process of pipe drainage. The Folkstone authorities having jurisdiction there preferred adhering to the system of brick sewers; and accordingly at the time the pipe drainage works were in process of execution within the district of the Local Board, some works of brick drainage were undertaken in the Folkstone portion, brick barrel drains laid in cement 14 and 12 inches diameter, and about 2,000 feet in length, being constructed. Mr. Harman informs me that this drain has been opened up several times since, once at various points about 30 feet apart throughout its whole length, and at another time in twenty different places, on all occasions owing to the circumstance of its having become choked with deposit.

This, if Mr. Bazalgette had heard of it (in so small a village, it is hardly to be supposed he did not), would probably have been considered by him as not a very happy illustration of the successful operation of brick sewers.

Water supply.

Before noticing any of Mr. Bazalgette's remarks upon the subject of water supply in this place, I would observe that in the first instance, when called upon to report to the Local Board upon a scheme of sanitary improvement works, I recommended that their supply should be taken from the stream known as Sandgate brook; but that in consequence of the opposition of private interests, this scheme could not be carried out, and I then had recourse to the alternative of obtaining a supply by underground drainage of the beds of green sand in the neighbourhood. The available supply from these sources, I estimated, would reach about 30,000 gallons per diem, a quantity amply sufficient for the present, and capable, by means of extended drainage works, of increase to any possible requirements of the district.

Derived from beds of green sand.

These expectations have been fully realised by the result. Mr. Harman informs me that the average supply last year was about 28,500 gallons, and estimates the probable available supply for the current year at 31,500 gallons per diem. The population at present supplied is about 1200, the total population of the district being about 1300. 28,000 gallons therefore giving more than 20 gallons per head per diem. The population of this place is increased during the summer

months ; Mr. Harman considers to the extent of one-half additional. He adds, that last year, in the height of the season, when there were 165 houses with an estimated population, local and transitory, of 1340 supplied by the works, the daily consumption averaged 18,000 gallons ; on some days being as low as 12,000, and on others reaching nearer 30,000 gallons.

On "constant" principle.

"The supply of water is upon what is termed the 'constant supply' system; but there has been so much waste from leaving the taps open, that the surveyor has been obliged to turn off the water from the mains every night for some months past, to give a sufficient supply during the daytime, so that during the night the houses having no cisterns are left entirely without water, instead of having a 'constant supply.'"

There have been some cases where the taps have been left open, and in many of them the surveyor has reason to believe it was wilfully done; the plugs of waterclosets, for instance, being fastened up during a whole night. But those cases are becoming fewer in number, since the inconvenience attending them is beginning to be felt and understood. In all cases where wilful waste of this kind can be proved, the parties are amenable to punishment, and the Local Board would probably enforce the penalties in this respect. It is true, also, that in consequence of the waste occasionally happening in this manner, the surveyor has for some months past shut off the supply from eleven at night till five in the morning. But whilst Mr. Bazalgette lays stress upon the privations thus inflicted upon the inhabitants during six hours out of the twenty-four (the very period, by the way, when most of them are usually in bed), is he aware that during last summer the supply of the Folkstone Water Company, who serve the portion of Sandgate which is not within the district of the Local Board, fell so short that the company had to send round notices to their customers, requiring them to economize their consumption, and threatening prosecution for penalties in cases of waste.

Supposed "impurity" from sand collection.

"The water is soft and of good quality, but in draining from the sand bed it carries with it a large quantity of sand, which collects in the reservoirs to the depth of about five inches in six months. The reservoirs are generally cleaned out twice in the year. This sand also collects in the water mains, and when the water is first turned on, or is drawn off in large quantities for watering the roads, it carries with it the sand, and renders its delivery turbid and impure; and the occupiers of the better houses generally filter this water themselves before drinking it."

"From my observations on this point, I entertain very serious apprehension that the rubble stone collecting or gathering drains, will in course of time become filled with sand, and that the quantity of water supplied will proportionately fall off and become insufficient."

Some sand has collected from time to time in the reservoirs, a fact purely and necessarily incidental to a plan of water supply newly draining from a sand bed; but Mr. Harman informs me that there is much less now than formerly, not a half or perhaps a quarter of what there was at first. In the reservoir at Shorne Cliffe, there has been a deposit of about three inches in depth in six months. The sand very seldom enters the pipes, and only at times when the water has been allowed to get too low in the reservoir. This inconvenience would doubtless in course of time cease, but whilst it lasts, an effectual remedy would be found in the insertion of a catch pit at the junction of the supply pipe with the reservoir. At the same time I would protest against the idea of fine sharp sand held in suspension in water rendering it "impure."

I need hardly remark upon the extraordinary process of reasoning upon which the "apprehension" suggested in the second paragraph of the above extract appears to be based, and which amounts to this, that the greater the quantity of sand which has drained out of a certain drainage area, the more will remain in it.

Cost of private works.

"The average cost of private works has been from £7 to £8 per house; but in some instances the cost of the drainage alone amounted to seven guineas per house. Taking the average at £7 10*s.* per house, these works when completed will amount to £2,475."

From statements furnished me by Mr. Harman, it appears that, except in extraordinary cases, such as that of schools and private houses of the superior class, the cost of private works has not exceeded £4 or £4 10*s.* per house. The following are instances of the cost of complete private improvement works, including water supply and waterclosets, seven houses £24. 15*s.*; three houses £14. 16*s.*; one house £4. 4*s.* 11*d.*; one house £3. 4*s.* 2*d.*; two houses £9. 7*s.*; eleven houses £48. The above are houses at or over £10 rental, some being as high as £14 and £15.

Conclusion. Condition and experience of drainage works at Rugby and Sandgate

In fine, so far as the drainage works of Rugby and Sandgate are concerned, I submit that Mr. Bazalgette's report abounds in errors, and gives an incorrect view generally of the circumstances of the case; and that so far from his sweeping assertion, "I am now enabled to report that the result of my "inquiries and observations on the application of the tubular "system of drainage in these five places, affords no proof of its "applicability to the metropolis, and no evidence of the cheap-"ness and efficiency of the works at these five places, which "should entitle the system to serious attention with reference "to the works to be undertaken for drainage in London;" being justified, the contrary is the fact; that the experience of the tubular drainage works in Rugby and Sandgate does afford "evidence of cheapness and efficiency," which should

Do not justify Mr. Bazal-

entitle it to serious attention with reference to drainage works to be undertaken whether in London or elsewhere, Without examining at length Mr. Bazalgette's statement of the "conditions under which pipe sewers are applicable, and not applicable," I will merely observe that the posi- "tion which he lays down, that the absence of some or "all of them in various instances must considerably cur- "tail the application over any large area of pipe sewers "exclusively," (though not very clearly expressed,) may be a very true one; and yet that the applicability of pipe sewers, in connexion or not with brick sewers over any area however large, is not in any way invalidated. Indeed the practice under the new system of drainage has been to recognise the conjoint use of brick and pipe drains wherever certain conditions as to area or drainage requirements are exceeded, the district being subdivided into convenient drainage areas for the purpose; and this system, which has been applied or is in course of application to several districts of extent more or less considerable (Liverpool, Manchester, Gloucester, Woolwich, Salisbury, Dover, and numberless others) might equally, it appears to me, be made applicable to portions of the metropolis itself, and with peculiar advantage to those outlying parts which would be altogether precluded from possessing works of drainage, if they could only be had at the expense of constructing brick sewers upon the old method.

gette's condemnatory observations, but the reverse.

Applicability of pipe drainage in connexion or not with brick sewers, to large districts.

Examples.

As an example of this I would refer to the case at Fulham, which was so recently brought under the notice of the Metropolitan Commissioners of Sewers by a deputation headed by the Bishop of London. In reply to the deputation, Mr. Jebb, the chairman of the Commissioners, is reported to have stated (Times, Nov. 2, 1853), that "calculating the "expense of brick sewers at 15*s.* or 16*s.* a foot, it would cost "upwards of £160,000 to render the sewerage of the parish "of Fulham complete," a charge which the property within the parish would be wholly unable to sustain. Whereas if pipe drains were employed, which doubtless they might be throughout the greater part of the district at the cost of 2*s.* 6*d.* a foot, the above large estimate (the basis of which I will not now dispute) might be reduced by three fourths at least.

Comparative cost.

Woolwich, in which a complete system of drainage (combined brick and pipe sewer) is now in course of construction under my direction, affords an example of the extent of saving to be effected by an application of the new principle.

In this case there are 986 yards of brick sewer, 1224 yards of cast-iron pipe sewer, and 14 miles 933 yards of stoneware pipe sewer, the total cost of the works being estimated at £15,500. If for the stoneware pipe sewers brick sewers are substituted at 12*s.* a foot, the total cost of the works would be £51,800.

Causes of failure in early experience of the system.

Undoubtedly there have been difficulties, failures, and disappointments of various kinds experienced in the early working of the new pipe system, as there have been in the first application of all new inventions and processes; but I confidently submit that these checks have been attributable either to the incomplete application of the principle upon which the system itself is based, or to unskilful workmanship or faulty material. In some cases pipes too large have been employed to carry off a small quantity of sewage, and in consequence have become choked with deposit; in other cases the lines have been laid unevenly; in others, the lines have subsided in consequence of sufficient care not having been taken to form the beds in which they have been laid; in others, they have been broken during the process of laying by the careless filling in of the trenches; in others, the pipes have been of insufficient thickness or of bad quality; in others, finally, the pipes have been carelessly fitted into each other, and their junction holes improperly stopped; and in all such cases, from one or other of the various causes indicated, the intended operation of pipe sewer has been frustrated or delayed. But are these difficulties to be looked upon as insurmountable, or as so serious in themselves, and so necessarily inherent in the system, and that system itself so worthless, as to deter from the attempt to overcome them? On the contrary, I feel convinced that a very moderate application of ingenuity and care will enable us to obviate all these difficulties with precision and certainty; and that the system in which they have occurred is well worthy of all the time and skill so bestowed upon it.

Correct principle in drainage works to aid flow by adaptation of size.

The chief point to be kept in view in laying out works of drainage intended to carry off refuse in a fluid state, or by suspension in water, is to aid the flow by adapting the size and form of the sewers to the quantities of sewage to be carried off through them.

In small places pipe drains present peculiar advantages.

In the case of small flows, stoneware pipe drains offer peculiar advantages to this end, which could not be obtained by any construction of brickwork, independently of which the cheapness of this description of drain is in itself a consideration of very high importance.

Objections raised against pipe drains.

The objections raised against tubular drainage are,

1. That the sewers being small are not amenable to the ordinary methods of inspection and cleansing by manual labour.

2. That their material is fragile.

3. That in laying they call for an amount of skill and accuracy not easily attainable, whilst the consequences of defective or careless workmanship are fatal to the action of the system.

How obviated.

I propose briefly to suggest what may be done to meet these objections.

Inspection and flushing.

1. As to the inspection and cleansing of the sewers, these objects may be attained by the construction of examination

and flushing wells and flushing pipes at convenient points, the former more particularly at all important junctions. This provision will afford complete and ready means of ascertaining what the working of any system and any line of sewer in it may be, and, in the case of obstruction, of cheaply and effectually removing it.

Strength,

2. The objection on the score of fragility has been to a great extent met by increased substance of the pipes and their improved manufacture, but it may be altogether obviated by a mode of laying to be described under he next head.

and accuracy, and durability obtained by laying in cement.

3. Accuracy in laying and durability in the system when laid may be obtained by the simple process of imbedding the pipes in a jacket of concrete of (say) four or five inches in thickness, proper moulds and templates being used, and ordinary skill secured on the part of the workmen employed. In this manner pipes of all sizes between six and eighteen inches are now being laid under my direction at Gloucester, Salisbury, Woolwich, and Dover, the additional expense entailed by the process not exceeding 5*d.* per foot lineal; perfect solidity is the result, the stone-ware pipes becoming as it were the lining of a tube of concrete, in which leakage and subsidence are next to impossible.

General conclusions as to purpose of the inquiries instituted by the Sewer Commissioners.

Throwing out these suggestions very briefly, as having occurred to me, and being practically tested in the course of my own experience; I cannot doubt, looking at the abundant evidence of the advantages of tubular drainage in the wide extent to which it has been applied, that a public body possessing the influence and the means of the Metropolitan Commissioners of Sewers might have done much valuable service, had they come forward dispassionately to investigate the operation of the system, and the merits and demerits developed in the course of its use, with a view of aiding in perfecting it, and at the same time affording practical information as to the circumstances and modes in which it may properly be made available within the district over which their jurisdiction extends. To this end, inquiry in quarters where the system had been brought into operation would undoubtedly have been a most proper step; it is only to be regretted that in the present instance the agent chosen for the purpose should have been one already avowedly opposed to the system, and who throughout his inquiries has but too obviously acted under the influence of his preconceived opinions, rather than with the object or in the manner to elicit facts which might qualify them. Mr. Bazalgette may consider himself justified in stating that as the result of his inquiries he is "now enabled to report," that the application of tubular drainage in the five places visited by him affords no evidence of cheapness, efficiency or other merit, which should entitle the system to the serious attention of the Metropolitan Commissioners of Sewers; but I submit that he has not afforded that Com-

The agent an avowed opponent of the system;

his report does not afford information upon which to arrive at any just conclusion on the subject.

mission "such information as will enable them to give the subject their fullest consideration," or to arrive at any just conclusion in regard to it.

(Signed) I have &c.
T. W. Rammell.

To the General Board of Health.

William Ranger, Esq., to Tom Taylor, Esq., Secretary, General Board of Health.

$\frac{1570}{54}$

London, 2 a, Pall-mall,
April 15, 1854.

Sir,

In accordance with the request contained in your letter of the 27th March $\frac{1133}{54}$, I beg to forward you the following remarks upon the report recently published by Mr. Bazalgette, the engineer of the Metropolitan Sewers Commission, on the drainage and water supply of several towns, amongst which is that of Barnard Castle, where I was appointed, and still continue, the consulting engineer of its Local Board of Health.

It is satisfactory to me to find, after a careful perusal of that part of the report which refers to Barnard Castle, that Mr. Bazalgette has been able to discover so few and such very trifling defects in either the drainage or water supply works at the above named place. Where there are defects, however, they are made the most of, and I therefore consider myself bound to notice various portions of Mr. Bazalgette's report, in some of which there seems to me to be a suppression, and in others a distortion of facts.

It is possible that these errors may have arisen from imperfect or hastily obtained information, as I find that Mr. Bazalgette spent but a very short time in Barnard Castle, and consequently acquired very few of his facts from actual observation or inspection.

Distinct systems of drainage.

The report begins by stating "that the town drainage is "divided into two separate and distinct systems of sewers: "1st. Those sewers originally provided to carry off the road "and surface drainage. 2d. Another system of sewers re- "cently provided under the General Board of Health to "carry off the house drainage."

Erroneous inferences of Mr. Bazalgette.

The inference intended to be drawn from the foregoing sentence is plainly this,—that in laying down the pipe sewers the road and surface drainage was excluded, because the former were not thought suitable to carry off the latter.

Road drains.

But the facts of the case are these: Till the execution of the new works, there was no proper system of sewerage whatever in Barnard Castle. There were, indeed, as in most towns of the same class, some few shallow drains which had been formed by the highway surveyors, but these had never been intended to receive house drainage. They were origi-

nally formed for the duty they now perform, viz. to carry off the rain water from the surface of the roads.

Former sewer still in use.

Consequently, when I was instructed by the Local Board to lay down for them a system of sewerage, and in connexion with it one of water supply, (I did what every one else would have done in my place,) I made use of the existing sewers as far as they were available, for the reception of house drainage. I provided a system of pipe drainage distinct from that of the old sewers, not because I considered the former unsuited for the reception of surface water, but, because the means of carrying off the latter were already in existence.

Confusion of terms used by Mr. Bazalgette.

Some confusion is produced in reading the report, by the use of the terms "public sewers and private sewers."

In point of fact, the works are divided into public sewers, and private house drains, the two terms being used in the sense in which they are applied in the Public Health Act.

Works not executed as designed from want of funds.

I ought, however, to mention, that in the present instance, the total extent of public works executed is not the same as I originally designed. The pecuniary resources of the Local Board being so small, they found themselves compelled in many cases to stop the sewers at a point short of that to which they were originally intended to go, and in these cases private individuals have been compelled to make their house drains proportionately longer.

Errors in quantities quoted by Mr. Bazalgette.

Mr. Bazalgette having, I presume, taken his calculations from the copies of my plans, where much that was intended to be "public sewerage" has been executed as "private house drainage," estimates the entire length of the public works at about 8,000 yards. From inquiry of the present local surveyor, however, I find that not much more than 5,500 yards of the drainage works are entitled to be classed as public sewers.

Description of joints, and mode of laying the pipes.

In speaking of the form and material of the pipes, Mr. Bazalgette mentions that "the joints are formed with cement, great care being taken to make them water-tight."

But he has taken no notice of a most important fact connected with these pipes, and one to which the complete success of the Barnard Castle works may in a great measure be attributed.

All the public sewers have been laid in clay puddle, so that each pipe lies in a complete mould or matrix of that material. This precaution has a double effect; it prevents any leakage at the joints, which is one of the difficulties the advocates of pipe sewers have had to contend against, and the puddle also affords the pipes great protection against any unequal pressure.

No leakage or fracture.

At Barnard Castle there have been neither leakage nor breakage in the pipes, so that the laying of them in clay puddle seems to have answered the end for which it was resorted to.

Position and depth of sewers.

Mr. Bazalgette goes on to say, "The sewers have been "laid at the backs of the houses, or under the side channels "of the streets, at an average depth of from 8 to 10 feet "below the surface, and they are subjected to little or no "traffic over them."

I think that Mr. Bazalgette has somewhat understated the average depth of the sewers, for in some instances, certainly, they are as much as 14 and 15 feet below the surface.

All these statements will admit of some modification.

Back drainage.

It is true that a system of back drainage has been carried out at Barnard Castle, but in several instances, and those in the leading thoroughfares, the sewers have been laid in the middle and not along the side channels of the streets. I find this to be the case in the whole of Bridgegate Street, in Thorngate, in the Bank, and along part of the Market Place, as well as in Newgate Street and Hall Street.

"Little or no traffic" is a relative term, but I may remark that Barnard Castle is the town of an extensive rural district, and that on the weekly market days there is, for the size of the place, a considerable amount of traffic in all the leading thoroughfares, and certainly more than sufficient to serve as a test of the soundness of the pipes, and their ability to resist external pressure.

Stoppages.

After giving a general description of the nature of the works, and mentioning that but three or four stoppages have occurred since their execution, Mr. Bazalgette draws the following conclusion:—"Indeed, considering the extraordi-"nary falls above named, the small amount of drainage "received, and the facility that exists in passing, at any "time, a rapid stream of water through the sewers and "drains, it would, with moderate sized pipes, be surprising "were it otherwise."

Inclinations.

As regards the favourable nature of the inclinations of the sewers at Barnard Castle, there can be but one opinion. But I do not see that the small amount of drainage affects the question, inasmuch as the sewers at Barnard Castle were designed to carry off a certain amount of house drainage, and this duty, as Mr. Bazalgette admits, they now fully perform. If the town had been bigger, the works would have been on a larger scale, and, I have no doubt, just as successful, when proportionately extended, as they are now admitted to be.

Flushing.

"The rapid stream of water through the sewers and drains," of which Mr. Bazalgette speaks, if at hand, is certainly not often put in requisition, for he himself says, in the same page of his report, "that the fire plugs are "opened, and the water allowed to flow through the sewers "for *about a quarter of an hour once a week*, in order to "cleanse them."

The stoppages that have occurred are thus described :— Stoppages described.

"The stoppages alluded to" (three or four in number, as already stated) "are said to have been occasioned by imperfectly formed junctions, or other unavoidable causes. In one instance, however, viz., a 6-inch branch pipe, laid near Thorngate, at an inclination of 1 in 200, and receiving the drainage from eight water closets, stoppages occurred, requiring a considerable length of pipe to be taken up, and the surveyor has reason to believe, that deposit is again accumulating in it, and that, in order to make it efficient, it will have to be detached from the main line, and reconstructed with a discharge into the river Tees, at a nearer point, so as to obtain a better fall."

"Another cause of stoppage, occurring in a private drain, arose from the joints not having been made watertight, so that the water escaped through them into the soil, leaving the deposit to accumulate and cause a stoppage in the drain."

The inclination at which this 6-inch branch sewer was originally laid down was that mentioned in the report, viz., 1 in 200. But the sewer has not been constructed at this gradient, for, as Mr. Brown, the clerk and local surveyor of the Local Board, stated in his letter to Lord Palmerston, of which a copy is inserted at the close of Mr. Bazalgette's report, "The contractors lost the level laid down upon the engineer's plan, in bringing up a branch" (which is that already alluded to in the report) "and it is upon too dead an inclination." Inclinations.

Mr. Bazalgette having alluded to the surveyor's opinion that this branch sewer will require relaying wholly or in part, I must again refer to Mr. Brown's letter, where, speaking of the relaying, he says, "Some portions of this branch "will, I think, have ultimately to be relaid, at a probable "cost of 7*l.* or 8*l.*"

I cannot refrain from noticing, that this is the one solitary instance of defect in a series of public works, extending over a length of more than three miles, and that even this comparative failure is owing to an accident, which might have happened just as easily in the construction of a brick sewer, though in the latter case probably the defect would not admit of being remedied at a cost of 7*l.* or 8*l.*

With respect to the failures in the house drains, it must be remembered that these private works are executed by persons too often inexperienced, and that, in many instances, false notions of economy lead owners or occupiers of property to carry out the house drainage in an imperfect or incomplete manner. Private works.

I ought also to mention that Mr. Anthony Morgan, the regular superintendent of the works, left Barnard Castle before any of the house drainage works were executed, so that the latter have not received that minute attention and

inspection which were undoubtedly given to the public sewers whilst they were in progress.

Experience of surveyor.

This circumstance brings me to that portion of the report where Mr. Bazalgette speaks of the surveyor's opinion of pipe drainage.

"The surveyor is of opinion, derived from experience, that the successful working of pipe sewers is essentially dependent upon perfect workmanship, and water-tight joints, with an abundant supply of water, and the exclusion of surface drainage coming from the roads."

Now the surveyor here spoken of is not Mr. A. Morgan, alluded to by Mr. Bazalgette in the early part of his report as the gentleman having charge of the execution of the works, but Mr. Brown, the clerk to the Local Board, who, in consideration of the limited resources of the district, has undertaken to combine with the duties of that office those of local surveyor also.

In saying this, I have no wish to detract from Mr. Brown's merits. On the contrary, few have had more reason than I have had to testify to the zeal and ability with which he, in connexion with the Local Board has carried out the provisions of the Public Health Act.

Surveyor not an engineer.

But Mr. Brown is not an engineer, and I have reason to know, that when he gave Mr. Bazalgette all the information in his power respecting the Barnard Castle works, he had not the slighest idea that any remarks of his were to be quoted, as "the result of the surveyor's experience."

Exclusion of surface drainage.

One of these is reported to have been "that he, Mr. Brown, "considered the exclusion of surface drainage coming from "the roads essential to the successful working of pipe sewers."

Surveyor's remarks.

Mr. Bazalgette has misapprehended the purport of Mr. Brown's remarks, as the latter said nothing about the exclusion of surface drainage from the pipes, though he did

Exclusion of drift.

say, that he considered it most important that means should be used to prevent the road detritus from being carried into the pipes along with the surface water.

Waterworks.

I am not aware that Mr. Bazalgette's remarks on the water supply require any lengthened notice. I may, however, mention that the small reservoir alluded to was never meant for storeage purposes, it was merely designed to secure a sufficient pressure in the pipes to force the water to the highest parts of the district.

Although when I inspected the district there seemed every reason to believe that the sources of supply were amply sufficient for the population of the district, an undoubted scarcity prevailed during last summer.

Cause of insufficiency.

Within the last few days, however, I am glad to find that the cause of the scarcity has been detected in the shape of a very serious leak at one of the iron mains, through which it is believed nearly one-third of the whole of the supply has for some time been running to waste. I am not without hope

that the stoppage of this leak may obviate the necessity for any further increase of the original source of supply, particularly if means be taken to guard against the waste which undoubtedly prevails in many of the houses and tenements by mere carelessness and inattention. Mr. Bazalgette mentions, "that, at the time of his visit to Barnard Castle, several "of the water-closets would not work, in consequence of the "water pipes being frozen up."

Execution of private works.

For this, the persons executing the works in these respective instances are alone to blame. I am informed by the surveyor, Mr. Brown, that remonstrances were made by the Local Board against the practice of laying the water pipes at so small a depth, and Mr. Brown himself pointed out to the persons doing so, that in summer they would have their water disagreeably warm, and that during severe weather the pipes would be liable to be frozen up, as proved to be the case during Mr. Bazalgette's visit.

Execution of public works.

The main water pipes are, I may observe, in all cases laid at a sufficient depth to allow the service pipes to be attached to the houses without any fear of frost affecting them, if the owners or occupiers of the property choose to take advantage of the arrangement.

Error of Mr. Bazalgette in designation of works.

Mr. Bazalgette, when speaking of the amount of the fourth general district rate, out of which the cost of the sewers is defrayed, again refers to what he calls "the double system of pipe and surface drainage sewers."

I have already shown that there is no double system properly so called. I may also add that the cost of keeping the old sewers in a state to carry off the rain water is so small as not to be worth mentioning.

I am not required to notice Mr. Bazalgette's conclusions with respect to the fairness of comparison between the drainage of London and that of a small country town like Barnard Castle.

Comparison of works in different towns.

No system would be propounded for the metropolis, without a full consideration of all the varying circumstances of the case, some of the most prominent of which are indeed enumerated in the report.

But it does not seem to me that these varying circumstances require an entire change of system, though they may no doubt render an extensive modification of that system necessary.

It is much to be regretted that Mr. Bazalgette, holding these opinions, should not have directed his attention to towns of greater size and population than Barnard Castle, and the rest on which he has reported.

There is, for instance, Manchester, where pipe drainage, though not exclusively adopted, has been carried out to a very great extent, and with, I believe, very successful results. However inferior to the metropolis, Manchester approaches it more nearly in this respect than any other town

in the kingdom, so that an examination into the system of drainage in that place would have been peculiarly advantageous to those who consider pipe drainage not applicable to large or populous places.

Mr. Bazalgette says, "that the average depth of the sewers "in London, is of necessity nearly double that of our country "towns and villages."

I am not aware how far a strict inquiry on this point might or might not confirm the correctness of the above remark, though I myself should feel inclined to attribute the depth of the sewers rather to the nature of the ground, and the depths of the basements, than to the size of any particular town.

Opinions said to be divided.

Mr. Bazalgette says, lastly, "my visit to Barnard Castle "was made on the 2d of January last, and I then found that "opinions were divided as to the necessity and advantage of "the works I have described. Some of the statements of "the residents went to show that the system pursued has not "been successful."

As these are general assertions, I can only meet them by a general answer, that, as far as I can ascertain, there is no hostile opinion to the works, though there may exist that difference of opinion which must always prevail respecting the importance or necessity of benefits and improvements of a public nature.

It is to be regretted that Mr. Bazalgette has not published the evidence, &c. of those persons who told him that the system pursued had not been successful, as his individual examination seems to have led him to an opposite conclusion.

General success of the works.

I may finally be allowed to remark that, whatever difficulties there may be in the way of an efficient and thoroughly well executed system of pipe sewerage, (and that there are difficulties no one will deny,) it is gratifying to me to find that, in Barnard Castle at least, these have been successfully overcome, and that a gentleman, entertaining strong objections to pipe sewers, should have been able to find so few failures, and such very slight defects in those which have been laid there.

I am, &c.

(signed) Wm. Ranger.

Tom Taylor, Esq.,
Secretary to the
General Board of Health,
Whitehall.

REPORT on Mr. BAZALGETTE'S STATEMENTS as to the Drainage, &c. of TOTTENHAM; and on some of the general Statements contained in his REPORT on the DRAINAGE and WATER SUPPLY of RUGBY, SANDGATE, TOTTENHAM, ST. THOMAS, (EXETER,) and BARNARD CASTLE. By W. LEE, Esq., Superintending Inspector.

General Board of Health,
Whitehall, May 4, 1854.

MY LORD AND GENTLEMEN,

IN obedience to your instructions, on the 27th ultimo, I addressed a note to Mr. Pilbrow, the engineer to the Local Board of Tottenham, stating that you had directed me to inquire as to the accuracy of Mr. Bazalgette's report on the sanitary works of that town, and that I should visit Tottenham for such purpose on the 1st instant.

In pursuance of such note, I spent Monday last in making an examination of the sanitary works at Tottenham, and was accompanied the whole time by Mr. Pilbrow, who afforded me all the information in his power.

In the following remarks upon Mr. Bazalgette's statements, I have taken the pages and paragraphs consecutively as they occur in his report.

Drainage before the new works.

The third paragraph, at page 22, headed "Drainage provided before the New Works," is intended to show that there are now two distinct systems of drainage in Tottenham, namely, the new works for house drainage, and a previously existing system of brick sewers, now used for surface or subsoil drainage.

Similar statements as to the other towns, and Mr. Bazalgette's general remarks, admit of no other conclusion either on the minds of the Commissioners of Sewers or the general reader. It is not to be wondered at, therefore, that the chairman of the Commissioners, addressing the Secretary of State for the Home Department, should state officially, "From this "report, the following FACTS may be collected, that in each of "the five towns there is a double system of sewers," &c. &c.

This is stated as a FACT with regard to all the five towns. Your Honourable Board has obtained from the engineers of the other places in question the most emphatic contradiction. And what is the fact with regard to Tottenham? Before any sanitary works existed, a great portion of the refuse of the town had been cast into open ditches and natural water-courses: and as these places became offensive, and injurious to health, portions of them were from time to time covered in with bricks. The term *system* of drainage, however, is totally misapplied to them, whether considered as to their extent, their character, or the object effected. The public sewers of the new system are 13 miles in length, but these old covered ditches are only about 2½ miles on the whole,

including all sizes, from 12 inches diameter to 5½ feet high by 4½ feet wide.

Many of them being natural water-courses could not have been filled up, and it would have been folly to have destroyed any capable of taking surface water, merely that another might be constructed for the combined purposes of house and surface drainage. Over the very small extent therefore in which they exist, they have been cleansed from filth, and permitted to receive surface water, and properly so. I have the authority of Mr. Pilbrow, and my own examination, for saying, that no system of brick sewers existed in Tottenham before the new works were constructed; that no brick sewers have been constructed there under the Public Health Act; and that no such system is required or contemplated.

Mr. Pilbrow says, that if he were compelled to construct back drains for the removal of surface-water, he should make them immediately below the surface, and still have brick drainage by pipes for sanitary purposes; and that the two together would cost much less than one large system of brick sewers, irrespective of the consideration of efficiency.

Cause of delay in sanction of plans.

In the next paragraph, on the same page, there is an insinuation that, Mr. Pilbrow having been appointed local engineer after Mr. Ranger's visit, impediments were thrown in the way of the Local Board by the General Board; and the consequence of an independent engineer being employed was, that the plans were not sanctioned until ten months after they were presented.

There is a most disingenuous suppression here, because in the very document from which Mr. Bazalgette learnt the fact of the delay,* there follows a quotation from a communication of the General Board most gratifying to the Local Board as to the suitableness of the plans.

Mr. Pilbrow says, "I have always received all possible "assistance from the General Board. There was never any "attempt to procure Mr. Ranger's appointment as engineer. "My plans were highly approved by the General Board; "and the delay of ten months so pointedly referred to by "Mr. Bazalgette was not at all caused by the General "Board, and had no reference to the engineering plans, but "was attributable to a dispute between the Local Board and "the Ordnance, as to the correctness of the survey."

Progress of works and experience of efficiency.

As to the paragraph on the same page, "Progress of Works," the anxiety of an engineer is, that the works should be properly executed; and having satisfactory proof of this, the experience of only a few months as to completed drainage works, that they are as clean as when newly laid

* A report presented by the Local Board to the inhabitants, a copy of which was given by Mr. Pilbrow to Mr. Bazalgette.

down, is as perfect a demonstration of the fitness of the principle upon which the works have been constructed as the experience of 20 years.

Such drains can and will do to-morrow and the next day what they did yesterday and the day before. I have answered this objection in general terms, because it is urged with equal impropriety of all the towns visited, as well as to Tottenham. And yet many other places might be adduced, besides the five towns visited, where pipe drainage has been in operation sufficiently long to afford the most satisfactory experience of its working to any reasonable and unprejudiced observer.

Sufficiency of outfall sewer.

The paragraph at the foot of page 22 refers to an alteration which Mr. Bazalgette says was the only one of importance that Mr. Pilbrow was required by the General Board to make in his plans; namely, the reduction of the size of the outfall sewer from twenty-one to eighteen inches diameter. Mr. Bazalgette takes upon himself to say "that there are "good grounds for believing that the outlet will have to "be taken up, and a brick sewer of larger dimensions sub-"stituted for it." I shall show, not only that there are no grounds for believing any such thing, but that satisfactory grounds for believing the very contrary were brought before Mr. Bazalgette. He was informed that the water main was six inches in diameter only, and the supply constantly on; and he has stated that the surface drainage is not intended to be admitted into the pipe sewers. Storing of water therefore is not resorted to, and the maximum quantity of sewage to be at present discharged is the water passing through the six-inch water pipe, the percolation of any springs in the gravel, and such solid or other refuse as is capable of removal along an eighteen-inch pipe. Mr. Bazalgette knows all this, and the additional fact that the outfall sewer is stated to be never half full, and that he found but a small part of its area occupied; and he has even stated, at page 25 of his report, that the average daily flow through the sewers is only 200,000 gallons. He is therefore utterly without excuse for having made an assertion so incorrect.

Mr. Pilbrow says that he has never known the stream of sewage rise quite to half the height of the sewer. At the time of my examination, during rain, it was $5\frac{3}{4}$ inches deep at about half a mile from the outlet; and at the outlet, owing to the increased velocity, it was only $2\frac{3}{4}$ inches deep. With an inclination of 1 in 1062, the stream was capable of discharging stones or brick bats of considerable size. The velocity there is about $2\frac{1}{2}$ miles per hour, so that within the space of about 60 minutes all excrementitious or other offensive matter from the most remote part of the town will be discharged at the outfall at a considerable distance from any habitation. The excrement, paper, &c. are quite unchanged, and there is scarcely a perceptible odour at the mouth of the sewer. In all my official experience under your Honourable Board during

the last six years, I cannot say that I have found less odour from a single open privy.

Mr. Pilbrow and myself entered into a calculation which, taking the present number of inhabitants, and the sectional area of water at the outfall of the sewer, would show that if the population were doubled there would be theoretically no good grounds for believing that the outlet sewer would need to be enlarged.

Sizes of pipe sewers.

At page 23, it is stated that "Mr. Pilbrow would not "again use pipe sewers larger than fifteen inches in diameter, "and those only under peculiar circumstances; beyond that "size he prefers brick sewers, upon the score of both effici- "ciency and economy."

There is nothing peculiar in this view of Mr. Pilbrow's, as to size. I believe that, from the difficulty of obtaining perfect pipes of large sizes, every engineer connected with your Honourable Board has long been of the same opinion and has acted upon it. The prices of pipes have rapidly increased, as greater strength has been insisted upon by the engineers connected with the Board, and at a more recent period the Commissioners of Sewers for the metropolis have adopted the increased strength; so that the use of better and more expensive pipes is now established, and beyond the diameter of fifteen inches a brick sewer becomes cheaper. It is incorrect, however, to say that it is more efficient; and on my pointing out to Mr. Pilbrow the opinion which Mr. Bazalgette had made him express in favour of brick sewers, he disclaimed it, and fully agreed with me, that if sufficiently strong pipes could be obtained larger than fifteen inches, and at the same price as the brick sewer, he should decidedly prefer the pipe sewer, as having some practical advantages over the brick sewer in laying or first construction.

The continuation of the same paragraph proves that Mr. Bazalgette is not acquainted with the fact that an eighteen inch pipe sewer is in efficient action, as the outlet for a population of 10,000 persons, but with a fall of only 1 in 1062.

There is nothing peculiar in the form of the Tottenham drainage pipes or the mode of jointing them. Great credit is due to Mr. Pilbrow for the care he has exercised in the construction of the works; but if the principle of drainage had been bad, the works would not have been successful, and the same degree of success is attainable and has been attained in other towns, some of which have not been visited by Mr. Bazalgette, and the works of sanitary improvement scarcely mentioned beyond their own precincts.

Flushing pipe sewers unnecessary.

Mr. Pilbrow has pointed out the mis-statement of Mr. Bazalgette as to flushing the sewers.

With properly constructed pipe sewers, I think the flushing shafts and man holes which Mr. Pilbrow has provided quite unnecessary. Mr. Bazalgette has stated the matter so as to induce the belief that there is a periodical flushing to remove

deposits, and consequently that deposits accumulate. Mr. Pilbrow states that the flushing has only been occasional, and was done merely that he might satisfy himself that there was no deposit. Flushing of sewers would not affect the smaller house drains, which are the most liable to obstruction. The operation may well be dispensed with, therefore, except for the purpose of proving that the sewers are free, which it is certainly capable of doing in Tottenham as elsewhere, although Mr. Bazalgette, with the facts clearly before him, denies it.

Ventilation equally attainable in cities as in rural districts.

The next paragraph has reference to ventilation of the sewers, which Mr. Bazalgette insinuates has been done surreptitiously in Tottenham, and would be effected with still greater difficulty "in a crowded city." In contradistinction to this, it may be affirmed that little difficulty exists in the complete ventilation of a properly constructed system of drainage even in a small town, and that no difficulty would be experienced in a crowded city, where the roof pipes could be made the chimnies for diffusing through many thousands of small apertures any emanations from the sewage. But this must not be understood as applicable to filth-depositing large brick sewers such as Mr. Bazalgette appears always to have under his eye when referring to "a crowded city."

Tottenham exceptional as to surface drainage being [illegible].

It is true that Mr. Pilbrow does not turn surface drainage into the sewers. The inclination of the outfall sewer is very small, and the whole surface of the town consists of loose material, from which a large quantity of detritus would, without arrangements to intercept it, no doubt be washed into the sewers.

There is scarcely such a thing as stone pavement in Tottenham. Mr. Pilbrow's precaution is in the direction of safety but there is no proof whatever that, with proper receptacles for silt, the surface drainage would choke the pipe sewers. The surface drainage is safely turned into the new sewers in other towns; and even if Mr. Pilbrow's opinion were correct. Mr. Bazalgette ought to have stated it merely as an opinion, and have added that Tottenham was an exceptional case. But this is not a question of brick sewers versus pipe sewers. It is rather a question of cesspools versus drainage. The character of the silt, the quantity of water, and the rate of fall being assumed, there would be at least as great a tendency to deposits in brick sewers as in pipe sewers; and as the brick sewers would only have the advantage of holding a larger quantity of deposit, Mr. Bazalgette's preference for them is really on the ground of their capacity as cesspools, for retention of solid matter, and not as channels for conveying refuse away.

Distorted statement as to cost of private improvements.

In the paragraph on "cost of private works," at page 24, Mr. Bazalgette has apparently laboured to produce an impression on the minds of his readers very far from what is correct.

That I may not be charged with using rather strong language unnecessarily, I quote his words, and afterwards state the facts. He says, "The cost of the private works is said "to average about 8*l.* per house; but they have in some "instances amounted to 60*l.* or 70*l.* I called upon a friend "resident at Tottenham, who put into my hands a bill he "had just received from the Local Board for private works "done to his house, amounting to about 40*l.*, the particulars "of which I have given at the end of this report, as it "affords a better general idea of the work performed, and "the prices charged than I could otherwise present. There "are numerous cases in which there is but one watercloset "to three or four houses, but to several houses of the better "class, there are two waterclosets."

At the end of his remarks on Tottenham, Mr. Bazalgette gives in full the details of the bill to which he has above alluded; but suppresses the name of the gentleman to whom it was sent. As Mr. Bazalgette mentions him as a friend, it may be as well to state that the gentleman referred to is Mr. E. C. May, a surgeon of good standing in Tottenham, occupying a large house, with stabling, carriage-house, gardens, &c., and as I shall presently show, the case is very far from giving a "general idea" of the works in Tottenham. I am informed that Mr. May has not been a warm advocate of the sanitary improvements effected by the Local Board.

It will be observed that Mr. Bazalgette in giving every item of the cost of private improvements at Mr. May's house, has carefully avoided stating the *rent, rateable value, size, or class* of the house. He adduces this instance, and no other, for the purpose of giving a "*general idea of the work performed and the prices charged*," for the private improvements effected under the Public Health Act. No one would suppose from the terms Mr. Bazalgette uses, that out of about 2,000 houses in the district, about 1,960 are smaller than Mr. May's, or, that out of about 1,700 houses connected with the public works by private improvements of drainage and water supply, the cost in about 1,690 instances was less than that of Mr. May's, or, that there were numerous instances in which the private improvements for both drainage and water supply had ranged from 2*l.* 3*s.* to 3*l.* 15*s.* per house, including watercloset apparatus.

Mr. May keeps his carriage, and has apparatus for washing it. He has a flower garden, and the means of watering it from the public works. He has a patent water metre which with the frame, fixing, and superintendence, cost not less than 5*l.* He has two waste water preventers, costing 2*l.*; besides eight cocks, and four waterclosets upon his premises, and his private drains are 212 feet in length. These are a few of the particulars of the case quoted by Mr. Balzagette, to give "a general idea," of the character and cost of the private improvements of Tottenham.

Mr. Bazalgette also states the costs of Mr. May's improvements incorrectly. He says "I called upon a friend resident "in Tottenham, who put into my hands *a bill* he had just "received from the Local Board for private works done to "to his house, amounting to about 40*l*." Now, with deference, Mr. May never put into his hand any such bill; in fact, Mr. Bazalgette himself has made the bill at the foot of page 29 of his report, out of three distinct accounts, with the last of which the Local Board had nothing whatever to do. I am assured by Mr. Pilbrow that neither he nor the Local Board had anything to do with the work done by Mr. W. Dowell for Mr. May.

The first account, amounting to 27*l*. 1*s*. 4½*d*. is for all the works legally chargeable under the Public Health Act, and Mr. May has the privilege of having the repayment distributed over 30 years, instead of paying the whole on the completion of the works. He has a further boon under the Public Health Act with respect to this amount. The 27*l*. 1*s*. 4½*d*. is an addition to the market value of the property of the owner, and the tenant has the right to deduct from his rent three-fourths of the annual payments he will have to make on account to the Local Board.

The general object of Mr. Bazalgette is obviously to represent the cost of private improvements under the Public Health Act as oppressive and injurious. The explanation and the facts, however, show that even in this exceptional case of comparatively great cost, the owner will only be chargeable for a series of years about 30*s*. per annum for these substantial additions to his property; and the occupier about 10*s*. per annum.

But I cannot avoid the inquiry, were these works of private improvement requisite to put the premises into a good sanitary condition? Perhaps the best practical answer is the second bill, for extra works executed at the request of Mr. May, and amounting to £10. 6*s*. 6¼*d*. This was not required by the Public Health Act, nor by the Local Board, but Mr. May was convinced that he should receive benefit equivalent to the expenditure, although the whole of the amount would fall at once upon himself. The propriety of the works therefore, as between the Local Board and the persons charged with the repayment of the cost, must be admitted.

At this point, the disposition of Mr. Bazalgette to exaggerate the cost of private improvements naturally raises another question:—

What would have been the sum total of Mr. May's bill for private improvements, if the works had been executed under the Metropolitan Commissioners of Sewers, and according to the principles held by them and Mr. Bazalgette? I have made a rough calculation, and have no hesitation in saying

that the amount would have exceeded £100, and the works would not have been nearly so efficient. I have the satisfaction of saying that as to cost, Mr. Pilbrow states, as his experience at Tottenham, that even the plumbers in the town had their works of private improvement executed by the Local Board, because they could not effect what was required so cheaply themselves.

Having gone at greater length than I intended into Mr. Bazalgette's exaggeration of the cost of private works at Tottenham, and his illustration of Mr. May's bill, as "*a general idea of the work performed and the prices charged*," I may be allowed briefly to recapitulate.

It appears that there is nothing general in the case; but that it is altogether *exceptional*; that only about one house out of every fifty in Tottenham is so large as that of Mr. May; that in about ten cases only have the private improvements cost so large a sum of money; that Mr. Bazalgette has exaggerated the cost by taking three distinct accounts, one of which had nothing to do with the Local Board, and calling them "a bill;" that still the economy and the equity of the Public Health Act prevents such "bill" from being a pecuniary burden, either to the owner or the occupier; that the improvements were requisite in the opinion of the Local Board, and also in the opinion of Mr. May, because he made large voluntary additions at his own cost, and that private improvements to effect the same object would have cost enormously more in the hands of Mr. Bazalgette.

As to constant water supply not dependent on any special apparatus.

With respect to the paragraphs headed "water supply" and "Mr. Pilbrow's preventor," there are some remarks, as there are in other parts of the report, intended as objections against the principle of constant water supply. It is a well ascertained fact that there is less waste of water where the system of constant supply has been adopted than where the supply is intermittent. Even the "eminent engineers" who objected to it in their evidence before the Health of Towns Commission ten years ago, have since adopted it. The principle is now adopted as the only "proper" mode of supply, and is beyond the reach of any objection from Mr. Bazalgette.

Conscious, apparently, that his numerous objections to the Tottenham works are entitled to little weight, Mr. Bazalgette has been too ready to attribute their efficiency to anything, rather than admit that the principle of pipe drainage is established. Great credit, as I have already said, is due to Mr. Pilbrow, for the care he has exercised in the designing and execution of the works; and he had the further advantage of being upon the spot, and personally superintending every operation; but the principle of a constant supply of water is not in the slightest degree dependent upon the use of his "Preventor." The same object can be, and is, accomplished for waterclosets, by various other means, wherever the

economy of water is required; and I am not aware that any other engineer has adopted the preventor. Apparatus for such a purpose would only be of importance where the water supply is deficient in quantity, and must rather be looked upon generally as an expedient to mitigate the evil of defective water works.

The success of the principle of pipe drainage, within its proper limits, as laid down in the minutes of the General Board on house drainage, and as exhibited in Tottenham and numerous other towns, is established upon a basis quite irrespective of such local and merely adjunctive arrangements. Beyond those limits the General Board has recommended and sanctioned the construction of brick sewers; but with the same principle of constant water supply, and the absence of any extraordinary restriction upon its use.

Cost of works generally exaggerated by Mr. Bazalgette.

At page 25, "Cost of Works," Mr. Bazalgette has put down the total cost of the private works at £16,000. Now the whole of the money borrowed for such purpose was only £13,000, and every account for private works has been paid by the Local Board. Mr. Pilbrow says:

"Even the amount of £13,000 was greatly more than the "Local Board could have required to be done at private "property, but owners have taken advantage of the clause in "the Act for the distribution of charges over thirty years; "and have effected immediate improvements in the value of "their property, and its sanitary condition, in matters which "the Local Board could not have insisted on."

On the last line of the same page (25) there is another proof of what I have observed, all through Mr. Bazalgette's report, namely, that when his mind reverts from any of the towns where improved works have been constructed, to the metropolis, he cannot conceive of anything here but large sewers through the centre of the streets, and direct and expensive drainage from every separate house across the street to the sewer.

There is no other way of accounting for the following dictum. He says of the works at Tottenham, "they could "always be done at a very much less cost there than *in the* "*streets* of London."

Mr. Bazalgette's results of examination contrasted with facts.

At page 26, Mr. Bazalgette professes to give the results of his examination, in the following words:—

"I regret that I was not enabled to institute so full and "complete an examination of the sewerage of Tottenham as "I could have desired; but, after such an investigation as I "had the means of making, the impression left on my mind "is, that this town does not yet afford the experience which "is required to establish the advantage and economy of so "general a use of pipe sewers, especially of such small sizes; "but that the arrangements introduced here by Mr. Pilbrow "for the supply of water for flushing and for other purposes,

" are superior to those which I have witnessed in other towns " I have visited."

Nothing prevented Mr. Bazalgette from making a full and complete examination. Mr. Pilbrow says he came as having authority from Lord Palmerston (which I presume was not the fact), and required the production of all the plans and documents of the Local Board. All possible assistance was rendered to him; he examined the plans, asked a multitude of questions, which were answered; and was accompanied over the whole of the works. Mr. Bazalgette was enabled to make, and did make, as full and complete an examination of the works as he desired.

With respect to the next part of the above paragraph, as to the experience "which is required" to establish the advantage and economy of so general a use of pipe sewers, the matter depends very much upon the disposition of the individual requiring the experience. All unprejudiced persons, anxious only for the truth, and determined neither to be imposed upon nor to mislead others by the distortion and suppression of facts, would be satisfied with proof that the works effectually accomplish the objects for which they were intended; but the whole report of Mr. Bazalgette upon this and the other towns visited, shows that the only experience "which is required" by him is, that pipe sewers are broken, choked, obstructed, or have failed. Every proof to the contrary he rejects, denies, or fritters away; and every isolated instance of temporary and partial failure from defective workmanship, or other preventible cause, he seizes upon with the utmost avidity, and presents it magnified and exaggerated as the general condition of the whole. If no stoppage has been known, he says, stoppages may exist without being discovered: if the system has worked so perfectly that the ground has not had to be opened since the sewers were laid, he says their condition is unknown, and he insinuates that they may be stopped; and even if manholes are opened for him in various parts of the district, and he has ocular demonstration that there is no deposit or obstruction whatever, in pipe sewers that have been daily and nightly performing their duty for one or two years, he still condemns them, because they do not "afford the experience which is required" by himself.

The remainder of the paragraph as to the results of his examination, attributing advantage to the pipe sewers from the arrangements for the "supply of water for flushing and for other purposes," requires notice. Before having acquired practical experience, Mr. Pilbrow thought that flushing might be necessary for the public sewers, and he provided the means of doing it. But he has become convinced by practical experience that flushing is not required. He has proved that the sewers keep themselves clean without flushing, and therefore flushing is of no advantage to them. The

process is, no doubt, serviceable in demonstrating that the drainage is free from obstruction, but inasmuch as it serves as a handle of opposition against the principle of the drainage, it is to be regretted that such an arrangement for flushing was made.

The arrangements introduced here by Mr. Pilbrow for the supply of water for other purposes, are either general or special; generally, there is a supply by pipes from public works, but the consumption of water per house in Tottenham is only about two-thirds that in many towns having such works; specially, the arrangements introduced by Mr. Pilbrow are professedly to restrict the waste of water. On neither view can it be said that the facts are in favour of the efficiency of a system of pipe drainage, against which Mr. Bazalgette has objected at page 5 of his report, "that they require to "have a considerable supply of water almost constantly "through them."

The efficiency of the system is due, therefore, to the propriety of the principle of pipe drainage within proper limits, and to the careful construction of the works, but not to any extrinsic or peculiar arrangements.

I feel now called upon to offer a few observations on Mr. Bazalgette's general remarks in the same report, pages 3 to 7 and 48 to 50.

On Mr. Bazalgette's general remarks.

In the paragraph, pages 4 and 5, Mr. Bazalgette gives reasons why, if pipe sewers are suitable for small country towns, they are not suitable for the metropolis. As to the points he has enumerated—levels, depth of sewers, and nature of soil,—all these may be, and are, quite as unfavourable in provincial towns as in London, and Mr. Bazalgette has instances of success notwithstanding. As to quantities of sewage and distance to be conveyed;—a pipe sewer of a given diameter, and rate of inclination will convey the same quantity of sewage the same distance in London as in any other place;—great density of population will only require (though not invariably), a more rapid increase in size of drain, whether in London or elsewhere. As to weight of buildings, traffic, and trade inconvenience,—of obstructions, conditions of pavements, compensation for loss of trade, payments to gas and water companies, &c., Mr. Bazalgette proceeds evidently on the assumption that every drain from every building must, in London, be separately brought to a public sewer in a great thoroughfare. All these objections vanish at the words "back drainage," which is in successful operation in London, and in many provincial towns, and is as applicable to the one as to the other. The only remaining point in the paragraph is the cost of the works. Mr. Bazalgette has shown that nearly all the places visited by him had obtained their drainage pipes from London. Take off the freightage in favour of pipes made and used in London, and it will be difficult to see,

Allegation that drainage suitable for country towns is unsuitable for London.

Levels depth and soil.

Quantity of sewage and distance.

Weight of buildings, traffic obstructions, pavements, gas, and water pipes, &c.

Cost of works.

after the consideration of the previous objections, why back drainage with pipes should be so much more costly in London than elsewhere.

Conditions under which pipe sewers are and are not applicable according to Mr. Bazalgette.

Beyond the object of desiring to condemn pipe sewers, and to confirm the practice rather than the experience of the Metropolitan Commission, the intention of the next paragraph is not very manifest. It is divided into five points, upon each of which I shall make a few remarks. Mr. Bazalgette has found that in the towns he has visited there were some old sewers of deposit, which the Local Boards, more advanced than the Commission of Sewers, considered unfit for sanitary drainage, and that such sewers have therefore been restricted to surface drainage, thus reducing the sizes necessary for the new drains; and he has come to the conclusion not only, as already noticed, that there are two systems of sewers, but also that pipe sewers are not adapted for surface drainage, although he admits, that where no old sewers exist the new ones are so used, and he does not show that they have failed.

1. Allegation that pipe sewers are not adapted for surface drainage.

2. Not fitted to receive house and subsoil drainage.

The second point in the paragraph is an assertion contrary to facts. Pipe sewers are not only fitted for, but do receive, both house and subsoil drainage. Within their proper areas, there are at least as "fitted" as brick sewers, and by the same arrangement, viz., perforations, where required in their upper part.

3. Require a considerable quantity of water.

The third point, "that they require to have a considerable supply of water almost constantly passing through "them," is an objection that would scarcely have been expected to be gravely urged by the engineer of the Metropolitan Commission of Sewers. Can there be drainage without water? What is a "considerable supply?" If supply be regulated by demand, will Mr. Bazalgette's large brick sewer, 3′ 9″ by 2′ 6″, which, he says, is "the ordinary size used,"* act efficiently with less water than the 18″ pipe he has figured within it?

4. Require comparatively steep falls.

Mr. Bazalgette has shown in his report that pipe sewers act efficiently with a fall of 1 in 1062. If this is a comparatively "steep fall," or, if he can show a brick sewer of the same size, or of "the ordinary size used," keeping itself clean for the same length of time, with the same fall, or rather with a less fall, and the same quantity of water, then he may venture to state (subject to contradiction by facts), that pipe sewers "require, under all circumstances, comparatively steep falls."

5. Should be large enough for settlement in laying, and to pass substances entering them.

The fifth point, that pipe sewers require to be sufficiently large to convey what is likely to enter the inlets is a proposition that I never heard disputed. It is a question merely of size, and not of pipes *versus* bricks. Mr. Bazalgette should have stated what "substances" could be passed

* See page 49.

through a sink pipe, or through a three-inch closet syphon, or any other single inlet, so as to require a sewer of "the ordinary size used," namely, 3′ 9″ by 2′ 6″.

Use of pipe sewers advantageous; abuse of them dangerous.

The next paragraph, and many others in the report, proceeds on the assumption (not original,* contrary to all the documents published by the General Board of Health for the guidance of Local Boards,† and already sufficiently refuted,‡) that the construction of brick sewers is proposed to be abandoned. The General Board has recommended pipe sewers in their proper place, and brick sewers in their proper place. It is satisfactory to find Mr. Bazalgette stating, after his visits to towns in which works have been executed under the Public Health Act as follows :—"The use of pipe sewers, "under the conditions above enumerated is, I conceive, ad- "vantageous, and under such conditions I would recommend "them, as indeed you actually do apply them."

Mr. Bazalgette recommends pipe sewers under the conditions already considered.

In this concession, and the admission, perhaps not intended, that under the same conditions as are requisite for provincial towns, pipe sewers may be used in the metropolis, all is granted that the General Board of Health has ever urged upon public attention.

Experience of two years in pipe sewers in towns.

It is very inconsistent in Mr. Bazalgette, with facts before him showing that pipe sewers, with low rates of inclination, have been in operation two years, and continue as clean as on the day they were put down, to say that these five towns "afford no real experience upon the subject." If this be so, why should he just previously have recommended them as advantageous, and why should he afterwards quote the opinions of local officers, and any *adverse facts* that he could lay hold of, as experience that *may be relied upon*, in any of the five towns in question, when such opinions and experience have been formed since the sewers?

Causes of stoppages.

In the next paragraph Mr. Bazalgette repeats the *hypothetical* case of a stoppage which he had illustrated by a diagram at page 12 of his report to the Commissioners in February, 1853. A similar *hypothetical* case of a stoppage is also illustrated by a diagram at page 9 of Messrs. Arnott and Page's report on Croydon. These cases are stated in every one of the three reports, in such a manner as to lead to the conclusion that stoppages from the sinking of pipes at the joints have actually occurred. It is known that Messrs. Arnott and Page urged such a proposition *hypothetically* upon several witnesses and could only obtain answers to the effect that if two pipes *should* sink at the joint to as great an extent as the diameter of the pipes, a syphon would be formed and a stoppage take place; but the witnesses are understood to have added that they had never known such a thing to hap-

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* *Vide* Arnott and Page's Report, p. 38.
† *Vide* Minutes of General Board on drainage of towns, p.p. 62. &c., &c.
‡ *Vide* Mr. Austin's report on the Croydon drainage, p. 4.

pen. No such thing has been discovered, and yet Mr. Bazalgette reiterates the *hypothesis* so as to appear like a fact.

Cost of pipe sewers.

It would be a waste of time to confute an argument against the pecuniary economy of pipe sewers, when we find the reporter, contrary to the facts brought before him, adding to the estimate, as due to pipe sewerage, the cost of two additional and independent systems of surface drainage and subsoil drainage, and moreover adding, as due to pipe drainage alone, the necessity for a proper water supply to the inhabitants of any town.

I have now remarked upon the whole of Mr. Bazalgette's preliminary statements to page 7. There are some further concluding remarks of a general nature at pages 48 to 50, upon which one or two observations might be made, but I find that they have been either anticipated in what is already written, or the same points have been fully considered in the minutes of the General Board on the drainage of towns.

Brick sewers not abandoned.

I must repeat that the whole argument of his concluding remarks is based on the incorrect assumption that the General Board has recommended the abandonment of brick sewers, although Mr. Bazalgette well knows, from their published documents, that such is not the case.

Falsification of the cost of works in the five towns, by Mr. Bazalgette.

The last general remark I have to make is to the unwarrantable liberty Mr. Bazalgette has taken in setting down, at whatever extravagant sum may have pleased him, the cost of works already completed and ascertained; and he has done this in contradistinction to the actual sums as stated by the local authorities of these towns. If he had been better acquainted with the Public Health Act, he would have known that Local Boards are restricted to one year's rateable value of their districts. A calculation even of the amounts that would be realized by the rates he has named would have shown him that no such capital sums have to be repaid.

Suggestion that the cost and his assertions be placed in juxta position.

I have to suggest that this serious error, extending to all the five towns in question, be exposed by a statement in a tabular form showing the rateable value, and consequently the borrowing powers of the Local Board in each instance, the actual extent of mortgages for public and private improvements sanctioned by the General Board, the actual cost of the works; and then following all these facts, the amount which Mr. Bazalgette has so precipitately asserted the same to have cost.

I have, &c.

WILLIAM LEE,

Superintending Inspector.

The General Board of Health,

&c., &c.

Letter from James Pilbrow Esq., to the General Board of Health.

Tottenham, April 5, 1854.

My Lord and Gentlemen,

In perusing the very favourable and candid report of Mr. Bazalgette upon the *Water Supply and Sewerage* of Tottenham, I find one or two trifling points upon which I think it as well to make an observation, because, though of very minor importance, and I am sure standing in the shape they do, only through some misapprehension on the part of Mr. Bazalgette, yet they *may* cause some erroneous impression upon the minds of yourselves or members of Local Boards and the public, which I am convinced is not the wish of Mr. Bazalgette, but that he will feel gratified to see an explanation of anything that might be misunderstood.

At page 23, under the head of "Flushing and Inspection Shafts," it states that the branch sewers are "flushed out every two or three months;" I would beg to observe here, that though I have had this done in some of my worst and flattest districts, it was not with the knowledge that such flushing *was required*, but as a means of discovering the state of the sewers, and in order to *prevent*, or at once put a stop to any embryo evil, and by doing thus, I think I attain the desideratum contained in the observation of Mr. Bazalgette in the latter part of the same paragraph, as I cerai nly can ascertain by this operation, (being performed carefully and by my method), the *state* of the sewer to *any point*, and throughout its whole length.

In reference to the cost of "Private Improvement Works," page 24, it is but right to observe, that, as the very name of these works implies, that in a cleanly and respectable man's house, these works are likely to be made to effect as great an *improvement* and afford as much private *convenience*, if not luxury, as so grand an opportunity offers, as the new and complete system of Water Supply and Drainage of a Town, where the Public Health Act is *properly* and skilfully carried out. The bill referred to, and given at page 27, is that of a medical man, Mr. E. C. May, who had much special and extra work done. A water *metre* fixed, convenience for drawing water for washing his carriage, watering his rose trees, in which he takes great delight, &c.; thus this bill will not represent a common case, which is proved best, by saying, that the average cost of laying on water to closets and kitchens, and laying house drains from same to main sewer, including all necessary works, apparatus, (and the "preventers,") with maintenance for five years, has been 8*l.* per house, numbering nearly 2,000 houses, which proves that, though in a few instances the cost was high, yet in many the cost must have been a mere trifle, in fact, we have many

when the *two* descriptions of works *together* has scarcely exceeded 2*l.* per house.

In the same paragraph, the latter part would bear reversing, and then would read thus,—"There are numerous cases of the better class of houses having two to five waterclosets each, but in several instances there is but one watercloset to two or three cottages.

I have, &c.

JAMES PILBROW,
Engineer.

To the Honourable
the General Board of Health,
Whitehall.

OBSERVATIONS on Mr. Bazalgette's Report to the Metropolitan Commissioners of Sewers on the Drainage and Water Supply of Saint Thomas, Exeter; by Robert Dymond and Sons, Surveyors to the Saint Thomas Local Board of Health.

Mr. Bazalgette's visit to Saint Thomas.

On the 29th January last, Mr. W. M. Benison, the clerk of the Saint Thomas Local Board of Health, received a letter from Mr. Bazalgette stating his intention of visiting the district on the 1st of February, for the purpose of obtaining information on which to found a report to the Commissioners on the applicability to the metropolis of the system of drainage carried out there. Unfortunately it was not possible, with only two days' notice, to set aside previous engagements, and we therefore requested him to postpone his visit for a few days that we might attend him in his inspection. It appeared, however, that Mr. Bazalgette's opportunity for visiting Saint Thomas was limited to the day he had previously fixed, and remembering that his inquiries on the spot were obtained from inferior sources, and confined within a too brief portion of a single day, it will not appear very surprising that, upon data collected in haste and set down in error, he should have founded conclusions differing widely from those formed by persons who had been enabled to watch the progress of these works from commencement to completion.

The object a result of his visit.

The object of Mr. Bazalgette's inquiry, as stated in his letter (page 4), was to ascertain how far the principles of drainage adopted in Saint Thomas are applicable to the metropolis, and his report on that district concludes with the expression of an opinion that "the works executed here do "not, up to the present time, afford any sufficient experience "of the success or failure of such an application of pipe "drainage."

The conclusion at which Mr. Bazalgette has arrived, appears to be shortly this: that the time during which the system has been in use here is not sufficient to prove its success.

As regards the amount of experience, the facts stand thus: The main sewers, commenced in September 1850, were ready for use in August 1851. The house drainage works then proceeded, and have progressed until, at the present time, more than $\frac{19}{20}$ths have been completed; but the drainage from the surface of the streets has been connected with the main sewers for more than two years and a half, so that they have for that time received road detritus, that particular species of material which all authorities in town drainage will admit to be most troublesome to deal with in sewerage works, by reason of its liability to accumulate and harden to a kind of concrete. In this case pounded flint is washed through gullies into the sewer pipes; flint being the material used for road mending in Saint Thomas; and it has been found by Mr. Clench, who rents the outfall tanks, that this substance constitutes nearly 50 per cent of the solid matter discharged there. Extent of experience of pipe drainage in St. Thomas.

Frequent opportunities were afforded of ascertaining the condition of the main sewers at various times, and at every point, when the branch drains were joined to the mains and our instructions were precise, that whenever such junctions were formed, observations should be made of the nature and amount of any deposit that might be discovered in the sewers. Upon these clearly recorded observations, we founded the assertion in our report to Lord Palmerston, that "no stoppage had occurred in a public sewer, and the greatest "amount of deposit in them had been $1\frac{1}{2}$ inches:" adding, "this is removed by the natural flushing afforded by rainy "weather." Under these circumstances, and with the clearest of evidence at our command, we distinctly declare that Mr. Bazalgette is in error when he affirms that "as they "have not been inspected since they were laid down, the "present condition of the sewers of the town itself must be "unknown." Seeing then that $2\frac{1}{2}$ years experience with the most trying substance for drainage works, experience obtained too under the varying conditions of drought, of moderate showers, and heavy storms; both before and after the addition of the ordinary house drainage and its attendant water supply, we may surely anticipate that sewers which have hitherto performed their functions, will continue to do so, and that the principles adopted in their construction are applicable elsewhere. Inspection of sewers.

On the evidence just now referred to, we also grounded the opinion that no pipes have been broken since they have been laid in the ground, and it is scarcely credible that any further confirmation can be seriously deemed necessary after the time that has elapsed since they were first buried. No pipes have broken.

We regret that we must also meet, with directly opposing assertions, other statements in Mr. Bazalgette's report.

Thus, he observes, that "before the new works were con- "templated, the surface drainage was provided for by means Error as to surface drainage.

" of some old brick sewers and cesspools," and he adds "These " old sewers and cesspools still exist, and in addition thereto " thirty-one new gullies have now been connected with the " new sewers, &c., &c." An ordinary reader of these words would very naturally infer that the new works are not complete in themselves, and that the old are still employed in aid of them: in short, that the old sewers and cesspools not only *exist* but are in *use*. Such an impression would be erroneous. The new system was designed without reference to the old, and the latter, though not yet entirely removed, has long ceased to be used, with an exception so inconsiderable that it cannot be held to invalidate the general allegation.

Flushing not required.

Mr. Bazalgette speaks of the frequent flushing of the sewers at " three places constructed for that purpose;" now the fact is, that only one shaft has been constructed for flushing purposes, and this, as already stated, in our report to Lord Palmerston, was provided as a matter of prudence in the most level portion of the main sewer, before experience had shown that no flushing was required.

It is true that the experiment of flushing has been tried occasionally at this point, but this has only tended to show that there is no real necessity for it, and that no important accumulations existed; the ordinary flow of sewer water with the occasional assistance of surface water in rainy weather having proved quite sufficient to clear the sewer without artificial aid.

Ventilation.

Mr. Bazalgette again fails in accuracy as regards the amount of provision for the ventilation of the sewers, when he confines it to " two or three instances in which the water " spouts from the roofs of the houses have been connected " with the upper ends of the pipe sewers." Ventilation has been secured by this and other means, wherever it has been practicable to do so, without allowing the foul air to escape so as to produce injury or a nuisance. About a dozen such instances can be already pointed out, and their number is increased as opportunity offers. On this subject, however, it should be observed that, owing probably to the level nature of the site of Saint Thomas, foul gases have not manifested so great a tendency to escape into the houses as has been observed in places where a greater variation exists in the levels of the sewers. The ventilation notwithstanding its simplicity has proved sufficient, and it possesses the additional recommendation of being very inexpensive.

Errors in description of outfall works.

Amongst the deficiencies which Mr. Bazalgette discovers in the sewerage system of Saint Thomas, the outfall arrangements encounter his animadversion. These consist of a set of closely covered brick tanks, so arranged as to receive alternately the discharge from the outfall sewer. They are situated at a distance of nearly half a mile from the town, and are let to a chemical manure manufacturer, who is strictly bound by his lease to carry on his operations in such

a manner as not to create a nuisance, and whose rent is sufficient to produce for the ratepayers a good return on their outlay.

The lessee has not yet completed his working arrangements, and as what he has already done has been of an experimental nature, it is impossible to say what the ultimate financial result may be; but the ratepayers of Saint Thomas, who are in the receipt of a rental, will scarcely be prepared to confirm Mr. Bazalgette's allegation that these works "have not, up to the present time, been of any practical utility." Nor can this single covered cesspool, placed at a distance from the town, and entirely beyond the view of any of its houses, be regarded otherwise than as a salutary exchange for the scores of cesspools, many of them open and few properly secured, which were formerly to be found in every part of the town. The terms in which Mr. Bazalgette has described the outfall arrangements, are calculated (if not intended) to convey a most inaccurate picture of their actual condition. We should be willing to devote a few sentences to a correction of the errors which render this paragraph of the report a misrepresentation, if it can be shown that the outfall works have any bearing upon "pipe drainage," or will help to solve the question of its "applicability to the metropolis." This we take to be the subject requiring elucidation at present, and we submit that an inquiry into the mode in which sewage matter shall be converted into profitable use has no place in a report on "principles of drainage."

Had the sewage been conducted to the outfall through the large brick sewers advocated by Mr. Bazalgette, the defects of the outfall works (if any) would still exist, and the pond which he has most unaccountably connected with them would still remain the "disgusting thing" which he so graphically describes.

Number of waterclosets drained.

In alluding to the number of houses drained, Mr. Bazalgette seeks to lessen the importance of the experience acquired in Saint Thomas, by showing that the number of waterclosets provided is not equal to the number of houses in the town. In reference to this, it is necessary to state that a very large proportion of the cottage tenements (which constitute three-fourths of the town) are built in courts approached from the streets by narrow passages. These courts are used in common by the occupiers, and are generally very contracted in space. The cottages have no back outlets, and the only means of exit is into the courts in front. To diminish these already too narrow spaces, by filling them with waterclosets, would not only be unnecessary and inconvenient, but undesirable on sanitary grounds. It has been deemed sufficient to provide that the amount of closet accommodation in each court shall be duly adapted to the number of persons requiring it, and so distributed as to be conveniently accessible from each tenement. That this has been done is undeniable.

Mr. Bazalgette's objection is, therefore, further met by the reply that the amount of fœcal matter conveyed through the drains is wholly irrespective of the number of waterclosets, for the quantity of this class of sewage is obviously determined, not by the number of waterclosets, but by the amount of population.

Error as to cost of private works.

But even assuming that each dwelling ought to have a separate watercloset, it will be obvious that this affords no foundation for Mr. Bazalgette's peculiar method of calculating the expense of private drainage. It appears that the average cost per house of the private drainage and water supply works was 4*l.* 2*s.* 6*d.*, and, assuming that there is but one watercloset to every two houses, he proceeds to double this amount by way of ascertaining what would have been the cost if each house had its separate watercloset. This, though plausible and ingenious, is fallacious; for if, instead of placing one watercloset in a given court, we erect two, the only doubled item of expense will be that connected with the closet and its fittings. There will still be the same drain pipe to the street sewer, the same surface water and kitchen sinks, the same number of rain shoots to be connected with the drains, the same quantity of pipeage from the main water pipes, and the same surface taps for domestic water supply.*

All these items help to make up the sum of 4*l.* 2*s.* 6*d.*, and they remain unaltered, or nearly so, by the increase of the number of waterclosets.

Mr. Bazalgette then proceeds to "reason from analogy," that the works have cost from 9,000*l.* to 10,000*l.* That they have not done so is probably a consequence of our not adopting the expensive system recommended by that gentleman.

Defects in execution prove success of system.

We forbear to extend these observations by referring to numerous other inaccuracies of varied degrees of relationship to the subject of inquiry, and which may be pointed out as further evidence of the hasty manner in which Mr. Bazalgette's materials must have been collected.

But suppose, by way of argument, that the facts stand as he has represented them,—that all the sewers are not ventilated, that the sewage tanks are of no practical utility, that waterclosets have not been provided for every house, and that the details generally are ill contrived and badly executed. What does it all prove? Simply this, that pipe sewers, even when laid under all the disadvantages of clumsy design and imperfect superintendence, will accomplish the intended object.

For the simple and undeniable fact stands unquestioned by Mr. Bazalgette, that for more than two years these tubular drains have rapidly removed the refuse from the streets and houses of Saint Thomas.

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* Mr. Bazalgette's remarks would lead to the supposition that the above named 4*l.* 2*s.* 6*d.* applies to drainage works only. It, in fact, includes works of private water supply, not only to the closets, but also for general domestic purposes.

There is one circumstance bearing so closely on the question into which Mr. Bazalgette was instructed to inquire, and one which must have been so glaringly obvious on even a superficial examination of these works, that it seems surprising that no mention of it is to be found in his report. Exeter water company afford a limited and uncertain supply.

We ought not to conclude these observations without supplying this omission, both on account of its connexion with the subject in hand, and as a further justification of our remarks on the haste with which Mr. Bazalgette's evidence was collected.

The Exeter water company exercised the right given them by the Public Health Act to prevent the Local Board from erecting waterworks of their own, by stating their ability and willingness to supply the district. They voluntarily acceded to the terms certified to be reasonable by the General Board of Health, so far as those terms related to furnishing a constant and unlimited supply, and the price at which this was to be given was fixed by arbitration.

Notwithstanding the previous declaration of the company, it presently appeared that their works were not in a condition to enable them to deliver a constant supply, and the assistance of Mr. James Simpson of Westminster was obtained in the extension of their works.

From the date of the arbitration to the present moment, the supply to Saint Thomas has been constantly interrupted, and the repeated remonstrances of the Local Board have been met by the excuse that the progress of their works prevented them from fulfilling their engagements. In the expectation of obtaining the company's water at all hours, the expense and other disadvantages of the house cisterns required under an intermittent system were avoided, and the closet pans were furnished with water pipes communicating directly with the main.

The defalcations of the water company have prevented the inhabitants from flushing their closets in the ordinary manner at each visit, and from obtaining what they required for cleanliness and general domestic use. Instead of being removed at once from the houses into the main sewers, by a regular and proper supply of water, the deposits in the water-closets and sinks have been afforded the opportunity of hardening and adhering to such an extent, that it was feared there would be some difficulty in keeping the sewers clear. Anticipating the possibility of stoppages under these circumstances, we have frequently drawn the attention of members of the Local Board to the necessity of taking some decided measures to ensure the observance of their agreement by the water company. These measures have not succeeded, and the consequence has been recently seen in the stoppage of a six-inch pipe laid at an inclination of only 1 in 700, for the conveyance of the sullage of an outlying block of fifteen houses to the main sewer; and yet, with all the disadvantages

of a water supply doled out at uncertain intervals, the pipe sewers with the above exception, have not been choked. It seems most unaccountable that this important fact should find no place in Mr. Bazalgette's report, and that whilst he is able to obtain from Mr. Simpson a statement of the quantity of water supplied, together with a few unfounded allegations respecting the pipe drains, he can furnish the Commissioners with no information on a point so materially affecting the subject of his inquiry. In recounting the imaginary deficiencies which presented themselves in the system of drainage adopted in Saint Thomas, Mr. Bazalgette has somehow failed to take note of this real and substantial obstacle to its success, and without entering at large upon the relative merits of the modes of drainage respectively favoured by the General Board of Health and the Metropolitan Commissioners of Sewers, we submit that the report to which these observations apply must suffer materially in value if its statements throughout admit of the same amount of correction as is applicable to the portion devoted to Saint Thomas.

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GENERAL BOARD OF HEALTH.

REPORT

ON THE

RESULTS OF THE DIFFERENT METHODS OF TREATMENT

PURSUED IN

EPIDEMIC CHOLERA.

ADDRESSED TO

THE PRESIDENT OF THE GENERAL BOARD OF HEALTH

BY THE

TREATMENT COMMITTEE OF THE MEDICAL COUNCIL.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1855.

REPORT.

In drawing up the present Report the "Committee on Treatment" have thought it right neither to depart from, nor to exceed, the strict limits of the duty assigned to them by the General Board of Health.

However they might feel disposed to offer their carefully digested opinion through a medium so authentic, they do not forget that the object of their labour is simply the commencement of a system of national medical statistics—a system which is intended to produce not opinions, but materials on which philosophical deductions are hereafter to be based.

They propose, therefore, to restrict their work to an analysis of the records placed before them, and to an arrangement of the results of that analysis, concluding with such deductions only as are plain and unequivocal.

The Committee have to report that the application made by the Board of Health to the various metropolitan hospitals, and to medical practitioners, requesting returns of cholera cases, with details of the circumstances, treatment, and issue, has been answered by the filled-up records of 2749 cases, all of which have been transmitted for their examination.

By means of a most careful but difficult classification, these 2749 cases have been arranged under various heads, and the treatment analysed, and its issue reduced to averages.

The Committee have proceeded to compare the results of different modes of treatment obtained by this analysis of the tabulated records, and they have added such inductive reasoning from these results as appear to bear practically on the mode of meeting any future visitation.

The cases are arranged in three classes.

1st. Those which have occurred in metropolitan hospitals, amounting to 1104.

2d. Those which have occurred in the metropolitan districts (not in hospitals), amounting to 1645.

3d. Those which have occurred in the provincial districts.

These classes have been subdivided according to the most

prominent character of the treatment pursued, and the cases are arranged under the four heads—

1. Alterative.
2. Astringent.
3. Stimulant.
4. Eliminant.

Of the whole 2749 cases, there have been, in metropolitan hospitals,

689 treated by Alteratives.
231 „ Astringents.
84 „ Stimulants.
100 „ Eliminants.

In the metropolitan districts (not in hospitals), there have been

977 treated by Alteratives.
426 „ Astringents.
196 „ Stimulants.
46 „ Eliminants.

Of the 689 cases treated by Alteratives in metropolitan hospitals, it is shown by a careful analysis of the tabulated records, that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 52 cases calomel was given in small doses frequently repeated - - -	34	8	26	50·	76·1
in 16 with emetics.* - - -					
15 salines.					
27 external stimulants.					
40 ice water.					
23 hot baths.					
In 381 cases calomel was given, larger doses, at longer intervals - - -	324	94	184	48·2	56·7
in 205 with salines.					
165 emetics.					
135 external stimulants.					
43 ice water.					
24 castor oil (small doses).					
107 hot water baths.					
100 turpentine glysters.					
In 105 cases calomel, with opium, was given -	70	22	44	41·9	62·8
in 63 with salines.					
4 emetics.					
9 external stimulants.					
80 { internal stimulants. hot water baths. ice water. castor oil.					

* It will be understood that in this and the following tables more than one of the accessory remedies were given in some of the cases.

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Deaths in Collapse Cases.
In 20 cases other preparations of mercury were given	14	3	13	65·	92·8
in 5 with salines.					
14 external stimulants.					
14 ice water.					
3 internal stimulants.					
9 solution of soda.					
9 hot baths.					
In 131 cases salines were given - - -	103	25	66	50·3	64·
in 96 with emetics.					
96 hot water baths.					
96 external stimulants.					
15 ice water.					
1 injection into the veins.					

Of the 231 cases treated by Astringents in metropolita hospitals, it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 170 cases sulphuric acid was given - -	123	27	98	57·6	79·6
in 141 with emetics.					
8 calomel.					
5 opium.					
35 external stimulants.					
121 internal stimulants.					
11 ice water.					
28 hot baths.					
In 36 cases chalk and opium were given - -	17	10	11	30·5	64·7
in 8 with calomel.					
9 internal stimulants.					
9 external stimulants.					
9 hot baths.					
14 ice water.					
In 9 cases iron alum and alum mixture were given	3	1	4	44·4	—
In 9 cases acetate of lead with opium were given -	6	2	5	55·5	—
in 5 with emetics.					
8 salines.					
9 external stimulants.					
9 hot baths.					
8 ice water.					
In 6 cases cinchona and quinine were given -	2	1	—	—	—
In 1 case gallic acid, stimulants, hot bath, and ice water - - -	1	1	1	—	—

Of 84 cases treated by Stimulants in metropolitan hospitals, it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 8 cases ammonia was given	7	1	6	—	—
in 6 with emetics.					
4 calomel.					
8 brandy.					
2 turpentine enema.					
In 39 cases brandy was given, with hot baths and ice water	38	16	25	64·1	—
In 4 cases ether was given	3	1	3	—	—
in 1 with emetic.					
3 brandy.					
2 opium.					
2 nitrous oxyde.					
2 hot baths.					
In 3 cases camphor and chloroform were given, with external stimulants, and emetics, hot baths	1	—	—	—	—
In 5 cases "cordial tonic mixture" was given	4	1	3	—	—
In 7 cases cajeput oil was given, with emetics, salines, and external stimulants (turpentine)	7	3	4	—	—
In 18 cases emetics, external stimulants, hot baths, and ice water	6	1	6	—	—
	66	23	47	55.9	71·2

Of 100 cases treated by Eliminants in metropolitan hospitals, it appears that—

	Collapse Cases.	Consecutive Fever.	Death.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 78 cases castor oil was given	74	13	59	75·6	9·7
in 48 with emetics.					
34 external stimulants and hot baths.					
15 capsicum, ginger, &c.					
11 calomel.					
2 ice water,					
2 turpentine.					
In 21 cases emetics were given	21	1	17	80·9	—
in 3 with ipecacuanha, in small doses.					
10 potass. tartr. of antimony.					
21 ice water.					
In 1 case olive oil was given	—	—	—	—	—

Of 977 cases treated by Alteratives in the metropolitan districts (not in hospitals), the analysis of the tabulated records shows that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 532 cases calomel was given in small doses, frequently repeated - -	338	72	249	46·8	73·6
in 270 with salines.					
98 emetics.					
62 opium.					
44 internal stimulants.					
34 external stimulants.					
21 chloric ether.					
19 solution of soda.					
In 201 cases calomel was given in larger doses, longer intervals - -	104	25	77	38·3	74·
in 102 with salines.					
27 chalk and opium.					
47 chloric ether.					
52 mineral acids.					
74 external stimulants.					
5 hot air baths.					
In 196 cases calomel, with opium, was given -	114	24	65	33·1	57·
in 120 with salines.					
39 chloric ether.					
5 soda solution.					
17 external stimulants.					
8 internal stimulants.					
4 ice water.					
In 13 cases other preparations of mercury were given	6	2	8	—	—
in 5 with salines.					
7 opium.					
In 35 cases salines were given - - -	21	9	12	34·2	57·1
in 9 with soda solution.					
11 opium.					
5 emetics.					
1 chloric ether.					
6 external stimulants.					
2 injection into the veins.					

Of 426 cases treated by Astringents in the metropolitan districts (not in hospitals) it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 238 cases sulphuric acid was given - -	119	24	93	39·	78·1
in 92 with opium.					
22 calomel.					
4 catechu.					
18 cinchona.					
5 gallic acid.					
6 emetics.					
40 external stimulants.					
29 internal stimulants.					
61 ice water.					
In 57 cases chalk mixture was given - -	20	4	13	22·8	65·
in 32 with opium.					
12 calomel.					
11 catechu.					
In 59 cases chalk and opium were given - -	12	2	7	11·8	58·3
in 3 with emetics.					
9 cinchona.					
28 catechu.					
5 calomel.					
In 37 cases acetate of lead was given - -	29	11	18	48·6	62·
in 30 with opium.					
13 calomel					
5 castor oil.					
4 chalk mixture.					
In 3 cases tincture of the sesquichloride of iron was given - - -	3	1	5	—	—
in 2 with calomel.					
1 opium.					
In 2 cases cathechu was given - - -	—	—	—	—	—
24 „ opium - - - -	8	9	5	—	—
2 „ extract of logwood - - -	1	—	—	—	—
1 „ sugar - - - -	—	—	1	—	—
2 „ gallic acid - - - -	—	—	—	—	—

Of 196 cases treated by Stimulants in the metropolitan districts (not in hospitals) it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 94 cases ammonia was given - - -	73	16	55	58·5	75·3
in 4 with emetics.					
52 ether.					
5 chloroform.					
20 calomel.					
14 opium.					
9 camphor.					
5 salines.					
25 external stimulents.					
10 brandy, &c.					

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 25 cases ether was given - - -	24	3	20	80·	83·3
in 1 with chloroform.					
15 opium.					
4 camphor.					
6 capsicum.					
4 external stimulants.					
2 brandy, &c.					
In 31 brandy, &c. was given - - -	23	2	12	38·7	52·1
in 6 with emetics.					
6 calomel.					
12 opium.					
1 nitrous oxyde.					
1 internal stimulants.					
1 capsicum.					
In 23 chloroform was given - - -	17	4	13	56·5	76·4
in 13 with opium.					
6 external stimulants.					
7 camphor.					
3 capsicum.					
4 creosote.					
1 turpentine enema.					
In 2 creosote with calomel and opium was given -	—	—	—	—	—
2 capsicum with calomel and opium -	1	—	1	—	—
19 camphor - - - -	5	—	5	—	—
in 1 with chloric ether.					
1 opium.					
1 camphor.					
10 capsicum.					

Of 46 cases treated by Eliminants in the metropolitan districts (not in hospitals) it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 46 castor oil was given - - -	38	5	30	65·2	78·9
in 24 with calomel.					
4 opium.					
1 croton oil.					
2 other aperients.					
5 salines.					
4 emetics.					
7 internal stimulants.					
3 ice water.					

For the purpose of facilitating comparison, Tables are appended in which the results of the prominent treatment are brought into view by the omission of accessory remedies.

Of 1,104 cases treated in metropolitan hospitals—

689 cases were treated by alteratives,

		Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 52	calomel was given, small doses	34	8	26	50·	76·1
381	calomel, larger doses	324	94	184	48·2	56·7
105	calomel and opium	70	22	44	41·9	62·8
20	other preparations of mercury	14	3	13	65·	92·8
131	salines	103	25	66	50·3	64·

231 cases were treated by astringents,

In 170	sulphuric acid was given	123	27	98	57·6	79·6
36	chalk and opium	17	10	11	30·5	64·7
9	iron alum, and alum mixture	3	1	4	44·4	—
9	acetate of lead and opium	6	2	5	55·5	—
6	cinchona and quinine	2	1	—	—	—
1	gallic acid	1	1	1	—	—

84 cases were treated by stimulants,

In 8	ammonia was given	7	1	6	—	—
39	brandy, &c.	38	16	25	64·1	—
4	ether	3	1	3	—	—
3	camphor and chloroform	1	—	—	—	—
5	cordial tonic mixture	4	1	3	—	—
7	cajeput oil	7	3	4	—	—
18	internal stimulants	6	1	6	—	—

100 cases were treated by eliminants,

In 78	castor oil was given	74	13	57	73·	77·
21	emetics	21	1	17	80·9	80·9
1	olive oil	—	—	—	—	—

Of 1,645 cases treated in the metropolitan districts (not in hospitals)—

977 cases were treated by alteratives,

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
In 532 calomel, small doses, was given -	338	72	249	46·8	73·6
201 calomel, larger doses - -	104	25	77	38·3	74·
196 calomel with opium - -	114	24	65	33·1	57·
13 other preparations of mercury -	6	2	3	—	—
35 salines - - -	21	9	12	34·2	57·1

426 cases were treated by astringents,

In 238 sulphuric acid was given - -	119	24	93	39·	78·1
116 chalk and opium - -	32	6	20	17·2	62·5
37 acetate of lead and opium -	29	11	18	48·6	62·
3 tincture of the sesquichloride of iron - - -	3	1	1	—	—
2 catechu - - -	—	—	—	—	—
24 opium - - - -	8	9	5	—	—
2 extract of logwood - -	1	—	—	—	—
1 sugar - - -	—	—	1	—	—
2 gallic acid - - -	—	—	—	—	—

196 cases were treated by stimulants,

In 94 ammonia was given - -	73	16	55	58·5	75·3
24 ether - - - -	24	3	20	83·3	83·3
31 brandy, &c. - - -	23	2	12	38·7	52·1
23 chloroform - - -	17	4	13	56·4	76·4
2 creosote - - -	1	—	1	—	—
19 camphor - - -	5	—	5	—	—

46 cases were treated by eliminants,

In 46 castor oil was given - -	38	5	30	65·2	78·9

The following Table, a combination of the two preceding shows the General Per-centages of the various modes of Treatment.

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	Per Cent. of Collapse Cases.
Alteratives.					
In 584 cases calomel was given, small doses	372	80	275	47·	73·9
582 „ calomel, larger doses	428	99	261	44·8	60·9
301 „ calomel and opium	184	46	109	36·2	59·2
33 „ other preparations of mercury	20	5	16	48·5	80·
166 „ salines	124	34	78	46·9	62·9
Astringents.					
In 408 cases sulphuric acid was given	242	51	191	46·8	78·9
152 „ chalk and opium, and chalk mixture with catechu	49	16	31	20·3	63·2
46 „ acetate of lead and opium	35	13	23	50·	65·7
24 „ opium	8	9	5	—	—
9 „ iron alum, and alum mixture	3	1	4	—	—
6 „ cinchona and quinine	2	1	—	—	—
3 „ sesquichloride of iron	3	1	1	—	—
2 „ extract of logwood	1	—	—	—	—
3 „ gallic acid	1	1	1	—	—
1 „ sugar	—	—	1	—	—
2 „ catechu	—	—	—	—	—
Stimulants.					
In 102 cases ammonia was given	80	17	61	59·8	76·2
29 „ ether	27	4	23	79·3	—
70 „ brandy, &c.	61	18	37	52·8	—
26 „ chloroform, &c.	18	4	13	50·	—
5 „ cordial tonic mixture	4	1	3	—	—
19 „ camphor	5	—	5	—	—
7 „ cajeput oil	7	3	4	—	—
18 „ internal stimulants	6	1	6	—	—
2 „ creosote	—	—	—	—	—
2 „ capsicum	1	—	1	—	—
Eliminants					
In 124 cases castor oil was given	112	18	87	70·1	77·6
21 „ emetics	21	1	17	80·9	—
1 „ olive oil	—	—	—	—	—

The evidence of these tables condemns the eliminant treatment altogether as a principle of practice.

It testifies against the stimulant principle, excepting as a resource in extreme cases.

It displays a decided advantage in the alterative principle, especially as carried out by calomel and opium; and it shows a still superior advantage in the astringent principle as applied through the means of chalk and opium—the general per-centage of deaths following each plan of treatment being,

Of Eliminants - - -	- 71·7 per cent.
Stimulants - - -	- 54· ,,
Alteratives, calomel and opium	- 36·2 ,,
Astringents, chalk and opium	- 20·3 ,,

In order to judge correctly of the value of this evidence, it is necessary to examine, as far as may be possible, the degree of severity of the cases brought beneath this test. The only means at our command (on the present occasion at least) to make this examination is to consider the relative proportion which the cases of collapse bear to the number of deaths of their own classes respectively. Examining, therefore, the collapse cases with the number of deaths, we find that calomel and opium stands highest in the scale of success, and the order of preference appears as follows:

Calomel and opium	- 59·2 per cent.
Calomel (larger doses)	- 60·9
Salines - - -	- 62·9
Chalk and opium -	- 63·2
Calomel (small doses)	- 73·9
Castor oil -	- 77·6
Sulphuric acid -	- 78·9

According to this result the superior success of calomel and opium in severer cases appears as a distinct fact, elicited by the present inquiry. It is accompanied by other facts, viz., the relative advantages of those other modes of treatment which follow in their order of success. This order marks the use of calomel in small doses, of castor oil, and of sulphuric acid, as actually to be deprecated in severe cases.

Chalk and opium, as shown above, stands at the head of the list in the general per-centages both in hospitals and in private practice, but in the comparison of the collapse cases with the number of deaths the average declines to the 4th rank.

In the hospital returns, though the cases of collapse are

much fewer, those of consecutive fever exceed the general average under this form of astringent. The deductions which might be made from these facts would be more valuable were a greater number of cases recorded. From the present limited amount the Committee are not disposed to generalize, but to reserve the evidence for comparison with future returns. It may, however, be briefly suggested that an obvious method of accounting for the discrepancy between the success of this form of astringent remedy, in the general and in the severer cases, would be to use the further testimony of the excess of consecutive fever in the severer cases; the inference would consequently remain that this treatment had checked the passage to the collapse stage, and increased the number of cases which survived to pass into that of fever.

It is apparent, from the returns, that the success of various modes of treatment in the hospitals follows the same ratio as those in private practice. As far as it goes, this is a valuable and interesting testimony that there is something real in the result arrived at.

Another rule obtains, showing throughout a greater mortality in hospital than in private practice.

Many reasons may be adduced for this excess. The cases in hospitals are almost always severe; they must all have undergone the process of removal, by which the patient is placed in the most unfavourable position of the body for a period, which, however short, bears a large proportion to the whole duration of the attack. They are at the same time exposed to loss of vital warmth, which tends to induce collapse. These incidents might be considered sufficient to counterbalance the relief from bad air, bad accommodation, and want of nursing in the dwellings of the poor. On the other hand, a large number of the private cases occur amongst the affluent or in the middle classes, amongst whom the disease is seldom left to its severer stages before treatment is had recourse to. That the favourable results should, in the aggregate, preponderate in private practice is therefore to be easily accounted for.

It is not to be doubted, besides, that the records of private cases are highly anomalous, and that the want of precision in the use of terms describing the various stages of the disease hinders, to say the least, the authenticity of the deductions from this class of returns. The mode of registration, as lately instituted in most hospitals, ensures a certain degee of uniformity; and for the present, at least, it

is obvious that these returns are the most reliable sources of information within reach.

It is no matter of surprise that these reports display no very decided relative per-centage of cures under any particular modes of treatment, because such a per-centage would have run counter to the experience of every practitioner, viz., that the disease is, for the most part, unmanageable in its severer forms and in the more advanced stages. But a certain advantage in any one plan of treatment, traced throughout the tables, is a fact as comprehensive as it is tangible, and one which will be received with greater confidence because it has no unreasonable pretensions; a fact which may safely be regarded as a real instalment of practical knowledge.

Although it is difficult, where several remedies have been employed, either simultaneously or in succession, to show the respective influence of each, yet some knowledge of the value of particular measures may be proximately arrived at by taking a large number of cases and reckoning the results of those in which they have and those in which they have not been used; such, for instance, as emetics, turpentine enemata, or ice water.

In 1,100 cases in metropolitan hospitals,
643 had emetics at the outset;
of these, 410 had collapse,
140 had consecutive fever, and
344 died;
or, 53·4 per cent.
or, of collapse cases, 83·9 per cent.
457 cases were treated without emetics;
of which, 303 had collapse,
106 had consecutive fever, and
226 died;
or, 49·4 per cent.
or, of collapse cases, 74·6 per cent.

It appears that out of 1,100 cases, there are
102 which, together with various other treatment, had turpentine enemata administered;
of these, 87 had collapse,
59 died;
or, 57·8 per cent.
or, of collapse cases, 67·8 per cent.

998 were treated without turpentine enemata,
626 had collapse,
511 died;
or, 51·2 per cent.
or, of collapse cases, 81·6 per cent.

It appears that out of 1,100 cases, there are,
496 in which, together with various other treatment, ice water was given;
of these, 404 had collapse,
248 died;
or, 50· per cent.
or, of collapse cases, 61·1 per cent.

604 cases in which ice water was not given;
of these 309 had collapse,
322 died;
or, 53·3 per cent., and more than the number of collapse cases.

Before concluding these observations on the returns which record treatment in the several stages of cholera and collapse, it is impossible not to express regret that medical practitioners are not more agreed in the accurate use of the terms to be employed in statistical returns, a defect which has hitherto impaired the accuracy of the documents and the certainty of the inferences.

Of all the essential aids to the success of statistical inquiry, none is so important as a careful revision of the nomenclature, together with a scrupulous accuracy in the use of terms when defined; and at a future visitation, practitioners, in recording their cases, will perceive the importance of aiming at a higher object than the advocacy of any peculiar plan of treatment.

According to the filling up of the present returns, no definite information can be obtained on the subject of "Consecutive Fever," because the duration of the attack exceeding so much that of the acute stage, it is impossible to ascertain at what period of the fever the various remedies have been administered, or whether they have been used successively or simultaneously; all that can be recorded from the evidence is, that of 272 cases of consecutive fever, rather more than two thirds had salines, one fifth had calomel, and eleven were treated by nourishment alone.

Local depletion was used only six times, general depletion only twice, and counter irritants (blisters) in twelve cases. One fifth part of the number had tonics.

The amount of deaths is 73, or 26·8 per cent. Fifty-four cases are reported to have gone into consecutive fever without having been in collapse.

In the metropolitan districts, (not in hospitals,) 296 cases of consecutive fever are reported, rather less than two thirds of which had salines; one tenth had calomel; twenty-three were treated by nourishment alone; one tenth had tonics; one ninth had stimulants.

The amount of deaths is 92, or 31· per cent. Ninety-four cases are reported to have gone into consecutive fever without having been in collapse.

It is obvious that no particular use can be made of the above statements; a defect which need be the less deplored, since cholera, in the form of consecutive fever, becomes analogous to other fevers, the treatment of which is generally understood, or at least is an important branch of continued study in the profession. It is a disease the management of which requires daily, almost hourly, vigilance and attention to symptoms as they arise, as well as an unremitting application of judgment to each particular case.

The average of deaths exceeds by something more than 5 per cent. that of the deaths in typhoid fever.

The Committee have to report, with deep regret, that the returns are almost silent on the topic of "Simple and choleraic diarrhœa passing into cholera."

Of 1,104 cases treated in metropolitan hospitals, from which the evidence of treatment in the stages of choleraic and collapse has been extracted, the information regarding the stages of "Simple and choleraic diarrhœa passing into cholera" is extremely faulty.

Of 1,008 cases, it is wholly unknown whether they were treated or not in the stage of simple diarrhœa:

73 were known not to have had any treatment in that stage;

23 only were treated by medicine in that stage.

Of 1,005 cases, it is wholly unknown whether they were treated or not in the stage of choleraic diarrhœa:

48 were known not to have been treated in that stage;

51 only were treated by medicine in that stage.

In 123 cases the stages of "Simple and choleraic diarrhœa" are reported as "absent."

The treatment of the small number of cases recorded is as follows:—

The following table gives the results of 51 cases of "Simple and choleraic diarrhœa passing into cholera," 23 of whom were treated in the stage of simple diarrhœa; and 51 in that of "Choleraic diarrhœa passing into cholera," in metropolitan hospitals.

22 cases were treated in both stages:

in 4 calomel and opium were given (large doses) throughout both stages;
8 sulphuric acid through both stages,
in 1 with chloric ether,
2 with opium and aperients;
3 chalk mixture through both stages;
1 chalk mixture in the 1st stage, calomel and opium and external stimulants in the 2d stage;
2 chalk and opium in the 1st stage, and calomel and opium (large doses) in the 2d stage;
1 iron alum through both stages;
3 castor oil through both stages;
1 salines and opium in the 1st stage only.

Of 28 cases treated in the second stage, only

in 13 calomel and opium were given (large doses),
in 1 with catechu;
1 salines;
6 sulphuric acid;
3 chalk mixture;
4 castor oil;
1 aperients and opium.

The returns of cases of "Simple and choleraic diarrhœa passing into cholera," in the metropolitan districts, (not in hospitals,) give 3,638 cases.

Of 3104 cases, it is wholly unknown whether they were treated in the premonitory stages of the disease.

239 it is known that no medical aid was given in either of the stages of diarrhœa.

In 35 cases, the stages of "Simple and choleraic diarrhœa" are reported as "absent."

184 cases were treated through both stages, viz., "Simple and choleraic diarrhœa."

137 cases were treated in the stage of choleraic diarrhœa only.

The treatment of the cases recorded is as follows:—

Of 184 cases in both the stages of "Simple and choleraic diarrhœa passing into cholera," it appears that

Alteratives.

In 25 cases calomel was given;
in 1 with aperients;
1 emetics.
In 13 cases salines were given;
in 7 with opium,
1 calomel.
In 6 cases sulphur and soda were given.

Astringents.

In 44 cases sulphuric acid was given;
in 15 with opium,
4 calomel,
2 catechu and kino,
2 stimulants,
1 aperients.
In 18 cases chalk mixture was given;
in 1 with calomel,
5 catechu or kino,
1 aromatic confection,
1 aperients,
1 stimulants.
In 67 cases chalk with opium was given;
in 8 with calomel,
7 catechu or kino,
2 aromatic confection,
6 stimulants,
2 external warmth.
In 4 cases extract of logwood was given;
in 1 with calomel,
1 stimulants.

Stimulants.

In 2 cases stimulants were given.

Eliminants.

In 5 cases aperients were given.

In 137 cases of "Choleraic diarrhœa passing into cholera," treated in the metropolitan districts, not in hospitals, it appears that

Alteratives.

In 26 cases calomel was given;
in 15 with opium,
2 stimulants,
7 aperients,
1 emetics.
In 7 cases salines were given;
in 1 with calomel,
1 stimulants.
In 1 case sulphur and soda were given.

Astringents.

In 41 cases sulphuric acid was given;
in 11 with opium,
1 calomel,
9 stimulants.
In 7 cases chalk mixture was given;
in 4 with calomel,
1 catechu or kino.
In 36 cases chalk with opium was given;
in 8 with catechu or kino,
2 calomel,
3 aromatic confection,
4 salines,
1 aperients,
4 stimulants.
In 1 case aromatic confection was given.
1 case catechu.
1 case extract of logwood.

Stimulants.

In 13 cases stimulants were given;
in 3 with opium,
6 catechu or kino,
2 emetics.

Eliminants.

In 2 cases aperients were given.
1 case emetics.

Showing so far a relative failure of the various plans adopted to stay the disease in its earlier stages. The number of cases treated, however, is but small compared with the whole;

consequently from these two tables by themselves no fair inference can be made as to the comparative success of different modes of treatment.

The reported facts upon the treatment of these early stages of the disease are therefore not sufficiently numerous or distinct to warrant any specific induction, yet it should be observed that this is the very point at which statistical returns are capable of displaying the most unequivocal as well as the most practically useful information. There are, without doubt, certain points which might be proved from full returns regarding the premonitory stages, and those facts would be most important in the management of the disease at any future visitation. They would especially serve to meet it at that early period of its course when it is definitely controllable by medicine.

Thus, for example, had the fact been shown by adequate statistics, that the majority of cases which have passed into cholera have been altogether without treatment in the earlier stages, then the value and necessity of prompt treatment would be entirely established.

Again, if any of the various modes of treatment could have been in like manner shown to be utterly inadequate to arrest the disease in its progress to the severer stages, then the disuse altogether of such modes would secure an early trial for a more approved treatment, and prevent the waste of irretrievable opportunity.

Inferences, as comprehensive as these, however desirable, must not be rested on the narrow basis of a few isolated returns. It is, therefore, earnestly to be hoped that this most important part of the statistics of cholera may receive the careful attention of the medical profession when they furnish returns on any future occasion.

It remains only to analyze the data from which may be ascertained what has been the treatment of all those cases of "Simple and choleraic diarrhœa," which have not passed into cholera.

The following table shows the cases treated in metropolitan hospitals. The number of cases is 504.

Alteratives.

In these cases

In 154 calomel was administered;

in 126 with opium,

2 astringents,

21 aperients,

2 salines,

3 stimulants, of which 1 died;

In 17 cases salines were given,
in 2 with astringents,
1 opium,
3 aperients,
5 mercury,
3 stimulants,
1 external irritants.

Astringents.

In 60 cases chalk mixture was given,
in 54 with opium,
21 aperients,
2 astringents,
2 salines,
2 stimulants;
in 118 cases sulphuric acid was given,
in 4 with opium,
36 external stimulants, of which 2 died.

Stimulants.

In 23 cases stimulants were given,
in 2 with astringents,
2 opium.

Eliminants.

In 132 cases aperients were given,
in 1 with astringents,
1 opium,
1 external irritants.

The following statement shows the cases treated in metropolitan districts (not in hospitals).

The number of cases is 3,337.

In which
in 90 cases calomel was administered,
in 16 with aromatic confection,
1 catechu,
21 logwood,
1 tonics,
13 aperients,
18 salines;

in 427 cases calomel with opium was given,
in 6 with aromatic confection,
18 catechu, &c.,
7 logwood,
8 acetate of lead,
68 aperients,
56 stimulants,
90 sulphuric acid,
99 salines;

in 122 cases salines were administered,
in 51 with opium,
1 aromatic confection,
7 catechu,
11 aperients,
6 stimulants,
25 other preparations;

in 318 cases chalk mixture was given,
in 42 with calomel,
56 aromatic confection,
49 catechu, kino, &c.,
14 logwood,
12 aperients,
18 stimulants,
2 sulphuric acid,
1 salines,
63 other preparations;

in 959 cases chalk with opium was administered,
in 169 with calomel,
38 aromatic confection,
224 catechu,
7 logwood,
1 tonics,
22 aperients,
59 stimulants,
53 other preparations,
6 sulphuric acid,
7 salines;

in 142 cases aromatic confection was given,
in 3 with catechu, kino, &c.;

in 18 cases logwood was administered,
in 12 with aromatic confection;

in 497 cases sulphuric acid was administered,
in 41 with calomel,
4 catechu,
16 tonics,
25 aperients,
67 stimulants,
4 salines,
2 other preparations;
in 265 cases sulphuric acid with opium was administered,
in 8 with calomel,
2 tonics,
2 aperients,
1 salines,
20 stimulants;
in 216 cases opium was administered,
in 10 with aromatic confection,
26 catechu,
6 logwood,
18 acetate of lead,
22 tonics,
68 aperients,
11 sulphuric acid,
15 other preparations;
in 205 cases stimulants were administered,
in 107 with opium,
35 calomel,
7 aromatic confection,
5 catechu,
7 logwood,
3 tonics,
6 aperients,
4 other preparations;
in 28 cases castor oil was administered,
in 17 with calomel,
3 opium,
1 catechu,
2 other preparations;
in 4 cases charcoal and oxide of zinc were given,
6 cases sulphate of copper and opium,
11 cases creosote was administered.

To the above cases, returned in detail according to the forms sent out, may be added the following, communicated

by different practitioners, stated by them only in the aggregate, with a general notice of the treatment.

The number of cases is 17,333.

Alteratives.

406 cases were treated with calomel,
188 - - - with calomel and opium.

Astringents.

916 cases were treated with chalk mixture,
833 of which had aromatic confection also;
8,247 cases were treated with chalk and opium,
in which 3,876 had calomel also administered,
2,500 ammonia and catechu,
1,029 other astringents;
6,454 cases were treated with sulphuric acid,
in which 2,912 had opium also,
1,532 calomel and opium;
1,122 cases were treated with opium alone.

In order to extract all practicable information from the foregoing statements, it will be useful to add all these cases (according to their classes of treatment respectively) to the cases of diarrhœa in the same hospitals and districts which have gone into cholera. Then by taking the per-centage of the cases which have passed into cholera compared with the whole number of diarrhœa cases in each class respectively, the relative proportion of failure of each class of treatment will appear.

TABLE of "Cases of Simple and Choleraic Diarrhœa" treated in Metropolitan Hospitals, and in Metropolitan Districts (not in Hospitals), which have *not* passed into Cholera, and also of Cases of Simple and Choleraic Diarrhœa which have passed into Cholera, together with the relative Per-centage of Failure to stay the Disease in its earlier Stages, under each Mode of Treatment.

TREATMENT.	Cases of Simple and Choleraic Diarrhœa which have not passed into Cholera.					Cases of Simple and Choleraic Diarrhœa which have passed into Cholera.		Total Cases of Diarrhœa.	Total of Failures to stay the Disease in its earlier Stages.	Per Cent. of Failure	If the Deaths are included as Failures.
	Treated in Metropolitan Hospitls.	Treated in Metropolitan Districts (not in Hospitals).		Deaths from Diarrhœa.		Treated in Metropolitan Hospitals.	Treated in Metropolitan Districts (not in Hospitals).				
		Detailed Cases.	Cases given in the aggregate.	In Hosp.	In Dists.						
ALTERATIVES :—											
Calomel - - -	28	90	406	—	—	—	13	524	13	2·4	—
Calomel with opium - -	126	427	188	—	3	17	38	741	55	6·9	7·1
Salines - - - -	17	122	—	—	—	2	20	139	22	13·6	—
ASTRINGENTS :—											
Chalk Mixture - -	6	318	—	—	9	7	25	324	32	8·9	12·6
Chalk with opium, calomel, and astringents - - -	54	959	*5,747	—	16	2	103	6,760	105	1·5	1·7
Chalk and aromatic confection -	—	—	916	—	—	—	—	916	—	—	—
Chalk, opium, ammonia, and catechu - - -	—	—	2,500	—	—	—	5	2,500	5	0·2	—
Aromatic confection -	—	142	—	—	1	—	—	142	—	—	—
Sulphuric acid with and without opium and calomel - -	118	497	6,454	2	13	14	85	7,069	99	1·3	1·5
Sulphuric acid and opium -	—	265	—	—	1	—	—	265	—	—	0·3
Opium - - -	—	216	1,122	—	36	—	—	1,338	—	—	2·6
Other astringents - -	—	21	—	—	†11	—	7	21	7	—	—
STIMULANTS - - -	23	205	—	1	4	—	15	228	15	6·1	8·1
ELIMINANTS - - -	132	28	—	—	—	8	—	160	8	4·7	—

* 3876 with calomel, 1029 with astringents. † Treatment not detailed.

Thus the order of per-centage of failure to stay the disease in its earlier stages, or in that of premonitory diarrhœa, is as follows :—

	Per Cent.	Or, including the Deaths from Diarrhœa as Failures, per Cent.
Salines	13·6	—
Chalk mixture	8·9	12·6
Calomel, with opium	6·9	7·1
Opium	—	2·6
Calomel	2·4	—
Chalk, with opium, calomel, and astringents	1·5	1·7
Sulphuric acid, with opium and calomel	1·3	1·5
Sulphuric acid, with opium	—	0·3
*Chalk, with opium, ammonia, and catechu	0·2	—
Taking sulphuric acid, with and without opium, and with calomel as an adjunctive remedy	1·33	1·54
Taking chalk with and without opium, together with aromatic confection and ammonia, with catechu, kino, logwood, and calomel as an adjunctive remedy	1·31	1·55

Showing a decided preference to the astringent plan of treatment in the early stages of the disease, or in the premonitory diarrhœa.

Although the facts gathered and digested during this investigation throw a most useful light on the comparative value of different modes of treatment, the Committee are of opinion that still more decisive evidence might be obtained under more favourable circumstances. The inquiry upon which they now report was not undertaken until the epidemic had already reached its culminating point, and when leisure for due pre-arrangement was wholly wanting. The work was partially impeded by the absence of experience in devising the most perfect method of drawing out the returns, and the answers have been less general than might have been expected, had the papers been sent out earlier and the

* A general return of cases in the aggregate—no details.

medical profession been more prepared to co-operate The Committee are therefore of opinion that much more might and would be effected by carrying out further the plan hitherto only partially successful.

They entertain a conviction, which has grown with the progress of the work, that by ensuring fuller and more numerous returns to a more complete and distinct form of inquiry, they would, on any future visitation of the disease, be enabled to collect ample store of available facts, and to deduce truths of the utmost importance both to guide medical practice and to enlighten science.

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GENERAL BOARD OF HEALTH

REPORT

ON THE

RESULTS OF THE DIFFERENT METHODS OF TREATMENT

PURSUED IN

EPIDEMIC CHOLERA

IN THE

PROVINCES THROUGHOUT ENGLAND AND SCOTLAND IN 1854:

BEING SUPPLEMENTAL TO

THE METROPOLITAN REPORT,

ADDRESSED TO THE

PRESIDENT OF THE GENERAL BOARD OF HEALTH

BY THE

TREATMENT COMMITTEE OF THE MEDICAL COUNCIL.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1855.

Report on the Treatment of Epidemic Cholera in the provinces throughout England and Scotland in 1854, being Supplementary to the Metropolitan Report addressed to the President of the General Board of Health, by the Treatment Committee.

Supplementary Report on the Treatment of Cholera in 1854.

It is to be observed that in the body of the "Report on Treatment," the cases under examination were arranged in three classes, which the Committee proposed to consider separately.*

The two first classes, viz.:—

1st. Those which occurred in metropolitan hospitals.

2d. Those which occurred in metropolitan districts (not in hospitals).

Were so examined and arranged; but it was found that the materials for the third class, viz.,

3d. Those which occurred in the provincial districts,

had not been wholly collected, and it was thought better to postpone the publication until the analysis could be complete. It is therefore now given in a supplementary form.

To this is appended an analysis of certain returns from metropolitan hospitals and other public institutions, which

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* Although the plan on which the Inquiry has been prosecuted can scarcely be misunderstood, it may be well to explain, in regard to the classification of treatment, that every case has been arranged according to that remedy on which the practitioner appeared to have chiefly relied, which, therefore, might fairly be regarded as the prominent treatment; that is, in other words, where it appeared in the reports that certain medicines had been repeated, whilst other medicines or measures in the same case, had been used only occasionally or sparingly, that case has been placed in the class of treatment to which the former medicines belong, and the latter medicines have been recorded in the Tables as accessory or incidental measures. According to the mode of drawing up the returns, which on the late outbreak were forwarded to practitioners, no more precise classification was found to come within the range of possibility, and even in this, the only practicable mode of working the returns, the difficulty and labour have been excessive.

It must be obvious to every thinking person that actual doses could not be stated in the Tables without rendering the report immensely voluminous; on the present occasion, however, this difficulty had not to be considered, because, in the great majority of the returns, the doses were not furnished. The distinction between the two modes of giving calomel, whether in large doses, or in small ones frequently repeated, having been stated in the returns, has accordingly been noted in the Tables.

have been sent in to the General Board of Health since the Report on Treatment was printed.

Of 800 cases of cholera treated in the provincial districts of England and Scotland, of which—

418 cases occurred in England, and
382 ,, Scotland.

It appears that—

416 cases were treated by Alteratives,
162 ,, ,, Astringents,
207 ,, ,, Stimulants,
15 ,, ,, Eliminants.

Of 416 cases treated by Alteratives in the provincial districts throughout England and Scotland, of which 212 occurred in England, and 204 in Scotland, it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	
				In Total Cases.	In Collapse Cases.
In 41 cases, calomel in small doses was given -	33	9	33	80·4	100·
in 2 with salines.					
9 internal stimulants.					
10 external stimulants.					
5 opium.					
2 opium by glyster.					
1 venesection.					
In 177 cases calomel in larger doses was given -	155	60	84	47·4	54·1
in 7 with salines.					
70 internal stimulants.					
18 external stimulants.					
5 hot air baths.					
8 venesection.					
76 chalk and opium.					
1 aperient.					
In 139 cases calomel with opium was given -	95	87	43	30·9	45·2
in 10 with salines.					
1 aperients.					
28 internal stimulants.					
84 external stimulants.					
1 hot air baths.					
3 venesection.					
In 47 cases other preparations of mercury were given	39	12	26	55·3	66·6
in 1 with salines.					
32 internal stimulants.					
4 external stimulants.					
3 hot air baths.					
4 opium.					
13 opium by glyster.					
In 12 cases salines were given - - -	9	3	9	75·	100·
in 2 with external stimulants.					
2 internal stimulants.					
1 hot air baths.					
1 opium by glyster.					

Of 162 cases treated by Astringents in the provincial districts throughout England and Scotland, of which 76 occurred in England, and 86 in Scotland, it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths.	
				In Total Cases.	In Collapse Cases.
In 55 cases sulphuric acid was given - -	45	8	36	65·4	80·
in 4 with calomel.					
3 catechu and other astringents.					
9 opium.					
5 opium by glyster.					
17 external stimulants.					
35 internal stimulants.					
3 emetics.					
In 27 cases nitric, nitrous and nitro-muriatic acids were given.	21	3	11	40·7	52·3
in 1 with external stimulants.					
1 internal stimulants.					
26 hot air baths.					
In 10 cases chalk mixture was given - - -	6	0	6	60·	100·
in 3 with calomel.					
2 salines.					
4 catechu.					
3 internal stimulants.					
In 32 cases chalk and opium were given - - -	18	14	13	40·6	72·2
in 13 with calomel.					
7 catechu.					
8 external stimulants.					
14 internal stimulants.					
2 hot air baths.					
In 12 cases opium was given - - -	7	5	6	50·	85·7
in 1 with calomel.					
4 catechu.					
5 external stimulants.					
4 internal stimulants.					
2 hot air baths.					
In 5 cases catechu, kino, &c. were given - -	5	2	3	60·	60·
in 5 with external stimulants.					
2 internal stimulants.					
3 calomel.					
3 opium.					
In 21 cases acetate of lead and opium were given -	16	10	16	76·1	100·
in 9 with external stimulants.					
8 internal stimulants.					
1 an emetic.					
1 opium by glyster.					

Of 207 cases treated by Stimulants in the provincial districts throughout England and Scotland, of which 128 occurred in England, and 79 in Scotland, it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths. In Total Cases.	Per Cent. of Deaths. In Collapse Cases.
In 12 cases ammonia was given - - - -	10	1	9	75·	90·
in 1 with ether.					
2 chloroform.					
1 emetics.					
5 external stimulants.					
7 brandy, wine, &c.					
7 opium.					
In 125 cases ether was given - - -	46	18	42	33·6	91·3
in 107 with opium.					
89 emetics.					
11 ammonia.					
1 chloroform.					
3 calomel.					
12 brandy, wine, &c.					
90 external stimulants.					
In 65 cases brandy was given - - -	47	6	50	76·9	100+
in 1 with emetics.					
20 external stimulants.					
26 hot air baths.					
36 opium.					
2 calomel.					
In 5 cases other stimulants, chloroform, &c. were given.	5	3	2	40·	40·
in 1 with hot bath.					
2 opium.					

Of 15 cases treated by Eliminants in the provincial districts throughout England and Scotland, of which 2 occurred in England, and 13 in Scotland, it appears that—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths. In Total Cases.	Per Cent. of Deaths. In Collapse Cases.
In 15 cases castor oil was given - -	12	—	10	66·6	83·3
in 1 with opium.					
10 external stimulants.					
2 ice water.					
1 venesection.					

Table of the 800 cases treated in the provincial districts throughout England and Scotland, viz.—

In England - 418 cases.
In Scotland - 382 cases.

omitting the accessory remedies.

In England 212
In Scotland 204 } 416 cases treated by *Alteratives.*

		Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths. In Total Cases.	Per Cent. of Deaths. In Collapse Cases.
In 41	calomel, small doses	33	9	33	80·4	100·
177	calomel, larger doses	155	60	84	47·4	54·1
139	calomel with opium	95	87	43	30·9	45·2
47	other preparations of mercury	39	12	26	55·3	66·6
12	salines	9	3	9	75·	100·

In England 76
In Scotland 86 } 162 cases treated by *Astringents.*

In 55	sulphuric acid	45	8	36	65·4	80·
27	other mineral acids	21	3	11	40·7	52·3
42	chalk mixture and chalk and opium	24	14	19	45·2	79·1
21	acetate of lead and opium	16	10	16	76·1	100·
12	opium	7	5	6	50·	85·7
5	catechu, kino, &c.	5	2	3	60·	60·

In England 128
In Scotland 79 } 207 cases treated by *Stimulants.*

In 12	ammonia	10	1	9	75·	90·
125	ether	46	18	42	33·6	91·3
65	brandy,	47	6	50	76·9	100+
5	chloroform	5	3	2	40·	40·

In England 2
In Scotland 13 } 15 cases treated by *Eliminants.*

In 15	castor oil	12	—	10	66·6	83·3

In a comparison of the total number of cases with the deaths, the order of success is as follows:—

Alteratives.

Calomel and opium	30·9
Calomel (larger doses)	47·4
Other preparations of mercury	55·3
Salines	75·
Calomel (small doses)	80·4

Astringents.

Mineral acids (except sulphuric acid)	40·7
Chalk mixture and chalk and opium	45·2
Opium	50·0
Sulphuric acid	65·4
Acetate of lead and opium	76·1

Stimulants.

Ether	33·6
Ammonia	75·0
Brandy	76·9

Eliminants.

Castor Oil	66·6

Per-centage of collapse cases, with the deaths; the more severe form of the disease:—

Alteratives.

Calomel and opium	45·2
Calomel (larger doses)	54·1
Other preparations of mercury	66·6
Calomel (small doses)	100·
Salines	100·

Astringents.

Mineral acids (not sulphuric)	52·3
Chalk mixture and chalk and opium	79·1
Sulphuric acid	80·0
Opium	85·7
Acetate of lead and opium	100·

Stimulants.

Ammonia	90·
Ether	93·
Brandy	100+

Eliminants.

Castor oil	83·3

TABLE of the Total Number of Cases (3,727) of Cholera treated in Metropolitan Hospitals* and Districts, and in the Provincial Districts throughout England and Scotland, showing the Per-centage of Mortality.

	Collapse Cases.	Consecutive Fever.	Deaths.	Per-cent. of Deaths: In Total Cases.	Per-cent. of Deaths: In Collapse Cases.
2,142 cases were treated by Alteratives.					
637 calomel small doses	416	94	315	49·4	75·7
767 „ larger doses	590	160	353	46·0	59·8
472 „ with opium	295	140	169	35·8	57·2
80 other preparations of mercury	59	17	42	52·5	71·1
186 salines	140	40	94	50·5	67·1
865 cases were treated by Astringents.					
488 sulphuric acid	307	65	235	48·1	76·5
27 other mineral acids	21	3	11	40·7	52·3
201 chalk mixture and chalk and opium	79	33	55	27·3	67·0
81 acetate of lead and opium	65	26	50	61·7	76·9
36 opium	15	14	11	30·5	73·3
13 preparations of iron and alum	7	2	6	46·1	85·7
19 gallic acid and other astringents	9	4	5	26·3	55·5
548 cases were treated by Stimulants.					
114 ammonia	90	18	70	61·4	77·7
154 ether	73	22	65	42·2	89·0
138 brandy	108	25	87	63·0	80·5
31 chloroform	23	7	15	48·3	65·2
111 other internal and external stimulants	80	16	50	45·0	62·
172 cases were treated by Eliminants.					
150 castor oil	134	19	104	69·3	77·6
21 emetics	21	1	17	80·9	80·9
1 olive oil	—	—	—	—	—

* The 179 cases in the Appendix, treated in Metropolitan Hospitals and other public institutions, are included in this Table.

Order of success in the different modes of treatment, in a comparison of the total number of cases with the deaths :—

	Per-centage of deaths in total cases.
†Gallic acid and other astringents	26·3
Chalk mixture and chalk and opium	27·3
†Opium	30·5
Calomel and opium	35·8
†Mineral acids (not sulphuric)	40·7
*Ether	42·2
External and internal stimulants	45·0
Calomel (larger doses)	46·0
†Alum and iron preparations	46·1
Sulphuric acid	48·1
†Chloroform	48·3
Calomel (small doses)	49·4
Salines	50·5
†Other preparations of mercury	52·5
Ammonia	61·4
†Acetate of lead and opium	61·7
Brandy	63·0
Castor oil	69·3
Emetics	80·9

In a comparison of the collapse cases with the deaths :—

	Per-centage of deaths in collapse cases.
†Mineral acids (not sulphuric)	52·3
†Gallic acid and other astringents	55·5
Calomel and opium	57·2
Calomel (larger doses)	59·2
External and internal stimulants	62·5
†Chloroform	65·2
Chalk mixture and chalk and opium	67·0
Salines	67·0
†Other preparations of mercury	71·1
†Opium	73·3
Calomel (small doses)	75·7
Sulphuric acid	76·5
†Acetate of lead and opium	76·9
Castor oil	77·6
Ammonia	77·7
Brandy	80·5
†Emetics	80·9
†Preparations of alum and iron	85·7
Ether	89·0

* In a large proportion of the cases, opium was given with the ether.
† Averages from a small number of cases.

Consecutive Fever.

Amongst the above-named 800 cases of Cholera in the provinces throughout England and Scotland, 234 cases of consecutive fever are reported to have occurred, or 29·2 per cent. Of these 75 occurred in England, or 17·9 per cent.; 159 occurred in Scotland, or 41·6.

Of the treatment of consecutive fever in the provinces,—

56	cases	were	treated	with	salines,	of which 21 died.
22	,,	,,		mercurials	,, 6	,,
101	,,	,,		aperients	,, 8	,,
1	,,	,,		diuretics	,,	,,
21	,,	,,		stimulants	,, 14	,,
3	,,	,,		external irritants	2	,,
5	,,	,,		nourishment alone	2	,,
In 23 the treatment is not recorded - -					3	,,
2 were not treated by medicine - -					1	,,

Of 234 cases 57 died, or 24·3 per cent.: a general mortality not exceeding the usual average.

In England of 75 cases 23 died, or 30·6 per cent.

In Scotland of 159 cases 34 died, or 21·3 per cent.

In England 4 cases are reported to have gone into consecutive fever without having been in collapse.

In Scotland 77 cases are similarly reported.

The most successful mode of treatment in consecutive fever, according to the foregoing Table, appears to have been by aperients.

In examining the remarkable proportion of consecutive fever in Scotland, it appears that in one district, Paisley,* 103 cases of consecutive fever have occurred in 110 cases of cholera. 50 of these only had collapse; 60 cases of cholera, therefore, went into consecutive fever without having been in collapse.

In all these cases, calomel and opium were used as the prominent treatment in the previous stages: there is no evidence in the returns, on this most interesting topic, whether the opium was given in any unusually large doses.

Fever is reported to have been prevalent at Paisley during the outbreak of cholera; but allowing certain weight to this latter cause, for the large number of cases which passed from cholera into consecutive fever, it is still a question, as they were all treated with calomel and opium,

* All these cases occurred in the practice of one practitioner.

whether the opium was given in large doses; in the latter case, the result would seem to correspond with the large proportion of cases of consecutive fever in the metropolitan hospitals, in which the use of opium, combined with chalk, appears to have been attended with like results.

In the present stage of these statistical investigations, it is desirable to invite a careful comparison of the results here stated with those recorded at page 14 of the Metropolitan Report. In any future extension of the inquiry, the quantity of the opium to be given is a question to be investigated with especial care. Should accumulated evidence bear the same character as that now obtained, it may lead to a demonstration that collapse may be superseded by the early use of opium, and it may then become a grave consideration how far it may be safe to induce the alternative of consecutive fever as the less unmanageable stage of the disease.

Many weighty arguments are worthy of consideration whilst waiting for further evidence; as, for instance, whether the degree of severity of the collapse may not influence, in a corresponding degree, the severity of the consecutive fever; but the duty of the Committee does not permit them to discuss this subject further, they merely throw out a hint of the nature of the service which these and further statistical materials may render to medical science.

Simple and Choleraic Diarrhœa passing into Cholera.

Of simple and choleraic diarrhœa passing into cholera, in the provincial districts throughout England and Scotland,—

866 cases are recorded, of which
448 occurred in England,
418 „ Scotland.

Of the 448 cases in England, it is wholly unknown whether 343 were treated or not in either stage.

23 were known not to have been treated.
82 were known to have been treated by medicine, and passed into cholera.
In 6 cases diarrhœa is reported to have been "absent."

Of the 418 cases in Scotland, it is wholly unknown whether 189 cases were treated or not.

74 were known to have received no medical aid.
155 were treated by medicine in both stages, and passed into cholera.
In 4 cases, diarrhœa is reported to have been "absent."

Of 237 cases of diarrhœa passing into cholera, treated in the provincial districts, of which 82 occurred in England, 155 in Scotland, it appears that,

Alteratives.

18 cases were treated with calomel;
7 in conjunction with stimulants,
1 „ „ astringents;

79 cases were treated with calomel and opium;
3 with internal stimulants,
1 „ astringents,
1 „ venesection;

13 cases were treated with salines;
12 with astringents.

Astringents.

8 cases were treated with chalk mixture;
1 in conjunction with calomel,
1 „ „ aperients,
1 „ „ stimulants;

66 cases were treated with chalk and opium;
23 with calomel,
4 „ internal stimulants,
1 „ external stimulants;

10 cases were treated with sulphuric acid;
4 with opium,
1 „ astringents;

8 cases were treated with acetate of lead and opium;
5 cases were treated with opium.
13 cases were treated with other astringents.

Stimulants.

14 cases were treated with internal stimulants.

Eliminants.

3 cases were treated with aperients.

Simple and Choleraic Diarrhœa not passing into Cholera.

Of 1,642 cases of simple and choleraic diarrhœa, which have not passed into cholera, treated in the provincial dis tricts throughout England and Scotland, it appears that,—

Alteratives.

57 cases were treated with calomel; 1 died;
- 36 in conjunction with aperients,
- 3 „ „ aromatic confection,
- 2 „ „ salines,
- 5 „ „ stimulants.

338 cases were treated with calomel and opium; 13 died;
- 7 in conjunction with aperients,
- 160 „ „ aromatic confection,
- 46 „ „ other astringents,
- 2 „ „ salines,
- 32 „ „ stimulants,
- 14 „ „ external warmth.

13 cases were treated with other preparations of mercury.

18 cases were treated with salines;
- 2 in conjunction with opium,
- 1 „ „ other preparations of mercury,
- 1 „ „ stimulants,
- 8 „ „ external warmth.

Astringents.

212 cases were treated with chalk mixture; 3 died;
- 5 in conjunction with calomel,
- 16 „ „ other preparations of mercury,
- 77 „ „ aromatic confection,
- 7 „ „ other astringents,
- 68 „ „ aperients,
- 4 „ „ stimulants,
- 3 „ „ external warmth.

412 cases were treated with chalk and opium; 16 died;
- 16 in conjunction with calomel,
- 36 „ „ other preparations of mercury,
- 38 „ „ mercurial aperients,
- 5 „ „ other aperients,
- 1 „ „ aromatic confection,
- 152 „ „ other astringents,
- 3 „ „ tonics,
- 18 „ „ stimulants,
- 3 „ „ external warmth.

363 cases were treated with sulphuric acid; 5 died;
61 in conjunction with opium,
9 „ „ calomel,
4 „ „ other preparations of mercury.
2 „ „ mercurial aperients,
4 „ „ astringents,
3 „ „ stimulants.

22 cases were treated with nitrous acid, in conjunction with stimulants.

63 cases were treated with acetate of lead; 2 died;
57 in conjunction with opium,
1 „ „ mercurial aperients,
1 „ „ other aperients,
4 „ „ astringents,
21 „ „ stimulants,
1 „ „ external warmth,
1 „ „ calomel.

53 cases were treated with opium; 3 died;
1 in conjunction with other preparations of mercury,
5 „ „ aperients,
4 „ „ mineral acids,
2 „ „ tonics,
2 „ „ stimulants,
18 „ „ external warmth.

5 cases were treated with persesquinitrate of iron;

4 cases were treated with other astringents, catechu, kino, &c.;
3 in conjunction with opium,
1 „ „ mercurial aperients.

Stimulants.

68 cases were treated with stimulants; 5 died;
3 in conjunction with tonics,
18 „ „ opium,
28 „ „ other preparations of mercury,
4 „ „ aperients.

5 cases were treated with external stimulants.

Eliminants.

5 cases were treated with castor oil;
4 in conjunction with opium,
1 „ „ stimulants.

4 cases were treated with other aperients;
3 in conjunction with mercury.

TABLE of CASES of SIMPLE and CHOLERAIC DIARRHŒA treated in the Provincial Districts of England and Scotland, which have not passed into Cholera, and also of Cases which have passed into Cholera; with the relative Per-centage of Failure to stay the Disease in its earlier stages under each mode of Treatment.

TREATMENT.	Cases of Diarrhœa which have not passed into Cholera, treated in the provincial districts of England and Scotland.		Cases of Diarrhœa which passed into Cholera, treated in the provincial districts of England and Scotland.	Total Cases of Diarrhœa treated in the provincial districts.	Per cent. of failure.	Or if the Deaths are included as failures.
	Cases.	Deaths.				
ALTERATIVES.						
Calomel	57	1	18	75	24·0	25·3
Calomel with opium	338	13	79	417	18·9	22·0
Other preparations of mercury	13	—	—	13	—	—
Salines	18	—	13	31	41·9	—
ASTRINGENTS.						
Chalk Mixture	212	3	8	220	3·6	5·0
Chalk and opium	412	16	66	478	13·8	17·1
Sulphuric acid with and without opium	363	5	10	373	2·6	4·0
Nitrous acid	22	—	—	22	—	—
Acetate of lead with and without opium	63	2	8	71	11·2	14·0
Opium	53	3	5	58	8·6	13·7
Other astringents—catechu, kino, &c.	9	—	13	22	59·0	—
STIMULANTS.						
Internal and external	73	5	14	87	16·0	21·8
ELIMINANTS	9	—	3	12	25·0	—

Thus the order of per-centage of failure to stay the disease in its earlier stages, or in that of premonitory diarrhœa, is as follows :—

	Per Cent.	Or, including the Deaths as Failures, per Cent.
Catechu, kino, &c.	59·	59·
Salines	41·9	41·9
Eliminants	25·0	25·0
Calomel	24·0	25·3
Calomel and opium	18·9	22·0
Stimulants	16·0	21·8
Chalk and opium	13·8	17·1
Acetate of lead and opium	11·2	14·0
Opium	8·6	13·7
Chalk mixture	3·6	5·0
Sulphuric acid and opium	2·6	4·0

The Returns from which the foregoing results have been obtained, have been filled up by the several practitioners, especially by those in Scotland, with considerable care and attention to the directions sent with the papers by the General Board of Health. The averages require little comment, except that on the whole they correspond with the average results of the Metropolitan Reports.

In this supplementary Report a Table is furnished (page 7) giving a collective statement of the whole number of cases examined in the Metropolitan Report, combined with the provincial cases noticed in the supplement and the metropolitan cases in the Appendix. It is worthy of remark, that the general averages of the cases, including the provincial, maintain exactly the same position in the order of success as was displayed in the Metropolitan Returns, with the single and small exception of sulphuric acid, which now precedes castor oil, leaving the latter to occupy the lowest place.

The two results are seen together, thus :—

	Per-Centage of Deaths in Total Cases.	
	Metropolitan Per-Centage.	Metropolitan and Provincial combined Per-Centage.
Of Eliminants - - - -	71·7	76·0
Stimulants - - - -	54·0	52·3
Alteratives (calomel and opium) -	36·2	35·8
Astringents (chalk and opium) -	20·3	27·3

	Per-Centage of Deaths in Callapse Cases.	
	Metropolitan Per-Centage.	Metropolitan and Provincial combined Per-Centage.
Calomel and opium - - -	59·2	57·2
Calomel (large doses) - - -	60·9	59·2
Salines - - - -	62·9	67·0
Chalk and opium - - -	63·2	67·0
Calomel (small doses) - - -	73·9	75·7
Castor oil - - - -	77·6	77·6
Sulphuric acid - - - -	78·9	76·5

JOHN AYRTON PARIS.
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NATHANIEL BAGSHAW WARD.

Analysis of Certain Returns of Cholera and of Simple and Choleraic Diarrhœa, treated in the Metropolitan Hospitals and other Public Institutions.

[*The Returns were sent in to the General Board of Health too late to be included in the former report.*]

Cholera.

Of 179 cases of cholera treated in Metropolitan Hospitals and other public institutions, there have been,—

60 cases treated by Alteratives.
47 „ „ Astringents.
61 „ „ Stimulants.
11 „ „ Eliminants.

Of the 60 cases treated by Alteratives in Metropolitan Hospitals and other public institutions, it appears that,—

—	Collapse Cases.	Consecutive Fever.	Deaths.	Per-cent. of Deaths, In Total Cases.	Per-cent. of Deaths, In Collapse Cases.
In 12 cases calomel was given in small doses frequently repeated.	11	5	7	58·3	63·6
in 1 with salines.					
5 calomel in larger doses.					
2 opium.					
2 internal stimulants.					
11 external stimulants.					
8 hot air.					
10 emetic.					
10 ice.					
In 8 cases calomel was given, larger doses, at longer intervals.	7	1	8	10·0	100+
in 6 with salines.					
1 internal stimulants.					
1 external stimulants.					
2 hot air.					
1 emetic.					
2 ice.					
In 32 cases calomel with opium was given	16	7	17	53·1	100+
In 15 with astringents.					
2 salines.					
6 internal stimulants.					
5 external stimulants.					
9 hot air.					
7 emetics.					
7 ice.					

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths,	
				In Total Cases.	In Collapse Cases.
In 8 cases saline was given - -	7	3	7	87·5	100·
In 1 with aperients.					
6 internal stimulants.					
3 external stimulants.					
6 hot air.					
1 opium by glyster.					
7 emetics.					

Of the 47 cases treated by Astringents in Metropolitan Hospitals and other public institutions, it appears that,—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths,	
				In Total Cases.	In Collapse Cases.
In 25 cases sulphuric acid was given - -	20	6	8	32·	40·
In 2 with calomel.					
9 opium.					
1 aperients.					
20 external stimulants.					
11 internal stimulants.					
9 emetics.					
17 hot air.					
18 ice.					
In 7 cases chalk with opium was given -	6	3	5	71·4	83·3
In 2 with calomel.					
1 aperients.					
5 external stimulants.					
4 internal stimulants.					
3 hot air.					
In 1 case alum mixture was given with external and internal stimulants, emetic, hot air, and ice.	1	0	1	100·	100·
In 14 cases acetate of lead with opium was given.	14	3	11	78·5	78·5
in 1 with astringents.					
7 external stimulants.					
8 internal stimulants.					
2 emetic.					
10 hot air.					
12 ice.					
5 bismuth.					

Of the 61 cases treated by Stimulants in Metropolitan Hospitals and other public instututions, it appears that,—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths. In total Cases.	Per Cent. of Deaths. In Collapse Cases.
In 3 cases brandy was given In 1 with emetic. 1 hot air.	—	1	—	—	—
In 58 cases emetic, external stimulants, hot baths, and ice water were given. In 2 with chloroform. 3 calomel. 2 ammonia. 4 musk. 1 camphor. 6 creosote. 1 internal stimulants. 2 opium.	57	11	31	53·4	54·3

Of the 11 cases treated by Eliminants, it appears that,—

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths. In total Cases.	Per Cent. of Deaths. In Collapse Cases.
In 11 cases castor oil was given In 10 with emetics. 10 external stimulants. 10 external warmth. 10 ice water.	10	1	7	63·6	70·

Table of the 179 cases treated in Metropolitan Hospitals and other public institutions, omitting the accessory treatment.

60 cases were treated by *Alteratives.*

	Collapse Cases.	Consecutive Fever.	Deaths.	Per Cent. of Deaths, In Total Cases.	Per Cent. of Deaths, In Collapse Cases.
12 calomel, small doses	11	5	7	58·3	63·6
8 calomel, larger doses	7	1	8	100·	100+
32 calomel, with opium	16	7	17	53·1	100+
8 salines	7	3	7	87·5	100·

47 cases were treated by *Astringents.*

	Collapse Cases.	Consecutive Fever.	Deaths.	Per cent. of Deaths, In Total Cases.	Per cent. of Deaths, In Collapse Cases.
25 sulphuric acid	20	6	8	32·	40·
7 chalk and opium	6	3	5	71·4	83·3
1 alum mixture	1	—	1	100·	100·
14 acetate of lead and opium	14	3	11	78·5	78·5

61 cases were treated by *Stimulants.*

3 brandy	—	1	—	—	—
58 emetic, external stimulants, hot baths, and ice water	57	11	31	53·4	54·3

11 cases were treated by *Eliminants.*

11 castor oil	10	1	7	63·6	70·

Comparing the total number of cases with the deaths, Astringents (sulphuric acid) stand at the head of the list.

The order of success in the treatment of the more severe forms of the disease, those namely, which were accompanied with collapse, is as follows:—

Sulphuric acid	40·0
External stimulants, hot bath, and an emetic	54·3
Calomel, in small doses	63·6
Castor oil	70·0
Acetate of lead and opium	78·5
Chalk and opium	83·3
Salines	100·
Calomel in large doses	100+
Calomel and opium	100+

These average results differ considerably from those given in the former Tables of cases treated in Metropolitan Hospitals.

It should be understood by those who are not in the habit of studying statistics, that the above small number of cases can afford no means of arriving at a definite statistical result; since, were limited portions to be extracted at random from any large statistical numbers, they would in all probability show a very different average to the mean of the whole mass.

The following Table shows in the first column the per-centage of deaths in the total number of hospital cases, as given in the former Report; in the next column the per-centage of deaths, when to the foregoing are added the supplementary cases examined in the Appendix; the third column gives the per centage of deaths of the collapse cases, as in the former Report; and the fourth, the same added to the collapse cases of the Appendix, showing in how slight a degree the original average is influenced by the addition.

	Per-centage of Deaths.			
	In total Cases.		In Collapse Cases.	
	Former Average.	United Average.	Former Average.	United Average.
Alteratives.				
Calomel, small doses	50·0	51·5	76·1	73·3
Calomel, larger doses	48·2	49·3	56·7	58·0
Calomel and opium	41·9	44·5	62·8	70·9
Salines	50 3	52·5	64·0	66·3
Astringents.				
Sulphuric acid	57·6	54.3	79·6	74·1
Chalk and opium	30·5	37·2	64·7	69·5
Alum mixture	44·4	50·0	100·+	100·+
Acetate of lead and opium	55·5	69·5	83·3	80·0
Stimulants.				
Brandy	64·1	59·5	65·7	65·7
Internal and external stimulants	33·3	48·6	100·0	58·7
Eliminants.				
Castor oil	73·0	71·9	77·0	76·1

Consecutive Fever.

Of 41 cases of consecutive fever returned from the metropolitan hospitals and other public institutions it appears that—

In 7 cases the treatment was not known; 4 deaths.

11 cases were treated with salines; 6 deaths.

3 in conjunction with tonics,
3 ,, ,, stimulants,
1 ,, ,, ,, and local depletion,
1 ,, ,, ,, aperients and tonics,
1 ,, ,, local depletion,
1 ,, ,, general depletion,
1 ,, ,, saline injection.

1 case was treated with mercurials in conjunction with stimulants and opium;

1 case was treated with diuretics;

1 case was treated with tonics in conjunction with local depletion;

20 cases were treated with stimulants; 9 deaths.

2 in conjunction with external irritants,
4 „ „ astringents,
2 „ „ tonics,
3 „ „ local depletion,
1 „ „ „ and tonics,
1 „ „ acetate of lead and opium.

Of 41 cases of consecutive fever, 32 cases had collapse, of whom 18 recovered and 14 died; 9 were without collapse, of whom 4 recovered and 5 died.

Simple and Choleraic Diarrhœa passing into Cholera.

Of simple cholera and choleraic diarrhœa passing into cholera in metropolitan hospitals and other public institutions, 180 cases are recorded.

In 90 of these cases it is wholly unknown whether they were treated or not in either of the stages of premonitory diarrhœa;
In 1 case diarrhœa is reported to have been absent;
33 were known not to have received any treatment;
56 were treated by medicine in both stages of diarrhœa, and passed into cholera.

Of the 56 cases of diarrhœa passing into cholera, treated in the metropolitan hospitals and other public institutions, it appears that—

Alteratives.

1 case was treated with calomel;
6 cases were treated with calomel and opium;
2 in conjunction with external stimulants,
1 „ „ astringents,
1 „ „ aperients.
2 cases were treated with salines.

Astringents.

10 cases were treated with chalk mixture;
2 in conjunction with aromatic confection,
3 „ „ aperients,
2 „ „ stimulants.

5 cases were treated with chalk and opium;
1 in conjunction with internal stimulants,
2 „ „ external stimulants.

7 cases were treated with sulphuric acid;
1 in conjunction with astringents,
1 „ „ aperients,
1 „ „ external stimulants.

1 case was treated with acetate of lead and opium in conjunction with external stimulants.

Stimulants.

18 cases were treated with stimulants (internal and external);
4 in conjunction with opium,
1 „ „ creosote,
2 „ „ aperients.

Eliminants.

6 cases were treated with aperients.

Simple and Choleraic Diarrhœa not passing into Cholera.

Of 296 cases of diarrhœa which have not passed into cholera, treated in the metropolitan hospitals and other public institutions, it appears that—

Alteratives.

1 case was treated with calomel;
42 cases were treated with calomel and opium;
3 in conjunction with aperients.
33 „ „ aromatic confection,
4 „ „ other astringents,
1 „ „ mineral acids,
1 „ „ stimulants.

46 cases were treated with salines;
5 in conjunction with calomel,
3 „ „ mercurial aperients,
9 „ „ other aperients,
25 „ „ external warmth

Astringents.

4 cases were treated with chalk mixture;
1 in conjunction with aperients,
1 „ „ external warmth.

97 cases were treated with chalk and opium, 5 died;
1 in conjunction with calomel,
1 „ „ other preparations of mercury,
20 „ „ mercurial aperients,
50 „ „ other aperients,
5 „ „ astringents,
4 „ „ stimulants,
5 „ „ external warmth

72 cases were treated with sulphuric acid;
24 in conjunction with opium,
3 „ „ calomel,
26 „ „ mercurial aperients,
5 „ „ other aperients,
5 „ „ astringents,
1 „ „ tonics,
6 „ „ stimulants,
2 „ „ external warmth.

7 cases were treated with acetate of lead;
7 in conjunction with opium,
5 „ „ mercurial aperients,
1 „ „ astringents,
1 „ „ mineral acids.

Stimulants.

5 cases were treated with stimulants;
1 in conjunction with opium,
3 „ „ mineral acids.

8 cases were treated with external stimulants in conjunction with emetic and ice.

Eliminants.

3 cases were treated with castor oil;
2 in conjunction with opium,
1 „ „ astringents.

Table of "Cases of Simple and Choleraic Diarrhœa" treated in the metropolitan hospitals and other public institutions, which have not passed into cholera, and also of cases of simple and choleraic diarrhœa which have passed into cholera, with the relative per-centage of failure to stay

the disease in its earlier stages, under each mode of treatment.

Treatment.	Cases of Diarrhœa which have not passed into Cholera.		Cases of Diarrhœa which passed into Cholera.	Total Cases of Diarrhœa.	Per Cent. of Failure.	Or if the Deaths are included as Failures.
	Cases.	Deaths.				
Alteratives.						
Calomel - -	1	—	1	2	50·0	—
Calomel with opium -	42	—	6	48	12·5	—
Salines - - -	46	—	2	48	4·1	—
Astringents.						
Chalk Mixture - -	4	—	10	14	71·4	—
Chalk and opium - -	97	5	5	102	4·9	9·8
Sulphuric acid with and without opium -	72	—	7	79	8·8	—
Acetate of lead and opium	7	—	1	8	12·5	—
Stimulants (internal and external) - -	13	—	18	31	58·0	—
Eliminants - -	3	—	6	9	66·6	—

The order of per-centage of failure to stay the disease in its earlier stages, is as follows :—

	Per Cent. of Failures ;	or,	If Deaths be included.
Chalk mixture - - - -	71·4		—
Eliminants - - -	66·6		—
Stimulants - - - -	58·0		—
Calomel - - - - -	50·0		—
Acetate of lead and opium - -	12·5		—
Calomel and opium - - -	12·5		—
Sulphuric acid - - - -	8·8		—
Chalk and opium - - -	4·9		9·8
Salines - - - - -	4·1		—

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GENERAL BOARD OF HEALTH.

MEDICAL COUNCIL.

REPORT

OF

THE MEDICAL COUNCIL

TO

THE RIGHT HON. SIR BENJAMIN HALL, BART., M.P.,

President of the General Board of Health, &c. &c. &c.,

IN RELATION TO

THE CHOLERA-EPIDEMIC OF 1854.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
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1855.

GENERAL REPORT

OF

THE MEDICAL COUNCIL.

To the Right Hon. Sir Benjamin Hall, Bart., M.P.,
President of the General Board of Health.

Sir,

In presenting our Report of inquiries conducted under your sanction into the course and phenomena of the late Epidemic of Cholera, the Medical Council may be allowed to express their satisfaction at Science having at length been recognised by the State as the ally of civil jurisprudence, and as the guide to a more enlightened code of medical police. They trust that this propitious movement may be regarded as the inauguration of a system ultimately destined to carry its ameliorating influence through all the ramifications of our sanitary institutions; and that the present fragmentary and imperfect application of medical knowledge in several departments of the State, may give place to a complete and comprehensive system, under the sole direction and control of one central department.

From the multifarious character of the objects embraced by this wide inquiry, it was found expedient to distribute them into several classes, and to entrust the examination of each class to a special section of the Council.

Of such special sections of the Medical Council, there were three: one, constituted to report on such *scientific inquiries* as it had seemed expedient to institute; a second, to digest from the general mass of contributed material whatever facts could illustrate the relative advantages of rival *methods of treatment;* a third, to invite from the cultivators of science in *foreign countries* any information which could be given as to the results of their kindred investigations.*

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* The members of the three Committees were respectively as follows:

Committee for Scientific Inquiries.—Dr. Arnott, Dr. Baly, Dr. Farr Mr. Owen, Mr. Simon.

Treatment Committee.—Dr. Alderson, Dr. Babington, Dr. Paris, Dr. Tweedie, Mr. Ward.

Committee for Foreign Correspondence.—Dr. Babington, Mr. Bacot Sir James Clark, Mr. Lawrence.

As it was the paramount object of the Council to collect from members of their profession all the facts which medical observation and experience could afford; so was it their first duty to frame such a formula of instructions as might secure amplitude, accuracy, and technical uniformity in the returns they were thus desirous to obtain; and when we consider the crushing pressure under which our medical brethren laboured during the ravages of this fearful epidemic, too much praise cannot be accorded to them for the alacrity and goodwill with which they responded to the call.

In adverting to the results respectively obtained by the three Committees of their body, the Council must first express regret that their *Committee for Foreign Correspondence* have not been successful in their endeavours to elicit satisfactory information; but it may be justly pleaded that difficulties of no ordinary kind embarrassed all our inquiries, which no amount of zeal and diligence could overcome. It will be remembered that the Medical Council was not called into existence until the epidemic had already passed its culminating point: the way had not been sufficiently cleared by preliminary inquiries, and the prospective path of investigation had not been traced or enlightened by any scientific pioneers.

The Scientific Committee have collected some valuable information with regard to the past epidemics, and much more as a guide to future inquiry. This is more especially the case with respect to the impure condition of the London atmosphere, and its capability of influencing the intensity of an epidemic; to the foul state of the Thames, and its share in rendering the atmosphere impure; and to the farther intimate connexion between cholera and local sanitary defects. An inquiry still pending, but nearly completed, will, it is believed, show an equally close relation between the epidemic and the impurity of the water used as a beverage.

The various sources of atmospheric impurity are too well known to require enumeration, but there is one which, on account of its paramount importance, cannot be passed over without comment, viz., the present system of sewers. The Medical Council do not presume to judge of the merits of conflicting systems, or to decide which best fulfils certain theoretical conditions for the conveyance of a given volume of fluid; but they confidently assert that the existing sewers often fail in accomplishing their main object. Instead of carrying off almost inodorously the excrementitious and refuse matters

of the population, they evolve offensive effluvia, provoking general and grave complaint; and it is a fact worthy of remark, that the intensity of this nuisance is greatly aggravated in certain parts of the metropolis by obstructions to which their drainage is subject by reason of its outfall into a tidal river. The reckless disturbance of the contents of sewers, and their exposure on an extended surface, more especially pending an epidemic, is a practice which the Medical Council feel it necessary to reprobate.

The Scientific Committee lay great stress upon that source of impurity which results within dwellings from overcrowding the inhabitants, from defects of drainage, and from want of cleanliness and ventilation; and they deem it indispensable for the protection of the poor that the local authorities should vigilantly exercise the powers committed to them for preventing such evils. The good effects of sanitary improvements have been strikingly exemplified in the model lodging-houses, and in public baths and wash-houses. The establishment of burial-places beyond the boundaries of the metropolis is another circumstance of prime importance, and the relief thus afforded to overcrowded churchyards will, no doubt, be regarded by the future historian as one of the greatest improvements in the nineteenth century.

The Metropolis Local Management Bill, introduced by yourself, and already sanctioned by one branch of the Legislature, is a subject of sincere congratulation, since it promises efficient sanitary government for the metropolis; and it is to be devoutly hoped that similar measures, equally needed for the whole country, will speedily follow. All these considerations are forcibly pressed upon us by the probability that epidemics of cholera may be frequent, if they do not actually become persistent; as we are fearfully reminded that the interval between the epidemics of 1831–2 and that of 1848–9 was 17 years, whereas the late epidemic followed the second after an interval only of five years.

Nor are such measures to be regarded merely as safeguards against the invasion of cholera; they are equally applicable, and not less effective, against the spread of other epidemics, such as the varieties of continued fever and scarlatina, which have been lately stated by the College of Physicians to be far more destructive to human life than even the periodical scourge of cholera.

The Scientific Committee have taken pains to investigate the possible relations subsisting between the outbreaks of cholera and certain meteorological conditions. Mr. Glaisher's

elaborate report will be studied with great interest. If in a subject so obscured by inappreciable influences he has not succeeded in arriving at absolute demonstration, he has gone very far to establish high probabilities, which future observation may raise into certainties. And, here again let us remark, that his admirable system of observations could not be fully organized until the epidemic had already attained its climax. He has, however, shown, that during the three epidemics there has existed a great predominance of calm, rendering the season defective in those atmospheric changes which renew the purity of the air, and, at the same time, an undue height of the barometer, operating against vaporous diffusion; and further, a great excess in the temperature of the Thames at night, as compared with that of the superincumbent atmosphere, giving rise to nocturnal clouds of vapour, which are necessarily charged with impurities derived from the foul contents of the river. The great principle which was first laid down in Dr. Farr's Report to the Registrar General respecting the relative immunity enjoyed at particular altitudes may be connected with this new link of evidence. Mr. Glaisher has clearly shown that in the low-lying districts, wherein the epidemic assumed its highest malignity, the air was stagnant, and moisture, impregnated with impurities, was especially induced to hover.

Special examinations of the atmosphere were conducted by Dr. Thomson and Mr. Rainey, but their results possess little more than a negative interest, since they failed to discover any new or significant element of an organic or inorganic nature, as a possible agent in the causation of cholera.

The chemical and microscopical inquiries into the water-supply of houses and districts suffering from cholera have been investigated by Dr. Thomson and Dr. Hassall, and the results are embodied in the Report of the Scientific Committee; and as the period is now at hand when the water companies will be required to have their sources of supply amended, the Medical Council state that the facts before them show the necessity of a stringent enforcement of the provisions of the Metropolis Water Act, and of an inquiry as to how far these provisions are adequate to insure the purity and wholesomeness of the water supplied to the public. For the abolition of cesspools—in itself a sanitary advantage—has indirectly led to another evil. The excrements of the population are now to a great extent poured into the Thames; and, as might have been expected, our chemical and microscopical inquirers concur in stating that traces of this abominable

filth are found by them in the drinking-water supplied to a large part of the population.

The extraordinary irruption of cholera in the Soho district which was carefully examined by Mr. Fraser, Mr. Hughes, and Mr. Ludlow, does not appear to afford any exception to generalizations respecting local states of uncleanliness, overcrowding, and imperfect ventilation. The suddenness of the outbreak, its immediate climax, and short duration, all point to some atmospheric or other widely-diffused agent still to be discovered, and forbid the assumption, in this instance, of any communication of the disease from person to person, either by infection or by contamination of water with the excretions of the sick.

In undertaking the pathology of the disease the Committee for Scientific Inquiries laboured under the disadvantage to which we have frequently adverted—the delay of all inquiry until the epidemic had already passed a climax; for, as they justly remark, "in order to obtain large results, it is most desirable that such inquiry should be commenced at an early period of the epidemic, and that, moreover, it should to some extent be continued in the absence of the disease which they aim at elucidating." Forms of instruction were, however, as speedily as possible prepared for circulation in order to obtain returns as to the stages of the disease, its duration, fatality, and relative frequency. A considerable amount of information was thus collected, and will be found embodied in a tabular form.

The duties of *the Treatment Committee* consisted, in the first place, in the invention of a mode by which the individual experience of practitioners might be brought under one comprehensive view, and thus has the science of statistics, for the first time, been applied on a large scale to medical treatment. The degree of faith which may be accorded to the inferences deduced by this method has been evidenced by the corroborative results of several separate sets of returns, or various materials separately worked, which have displayed corresponding results. The difficulty of devising a mode of extracting statistical facts from voluminous returns sufficiently shows that the work ought only to be considered as in the progress of development; and the same consideration justifies a belief that the farther prosecution of the inquiry, aided by the experience now gained, may carry it forward towards a far greater state of perfection, and elucidate truths of still greater value.

The facts elicited relate chiefly to the absolute inutility or relative inefficiency of certain classes of medicines and measures, thus clearing away valueless modes of treatment and redeeming from idle waste the few short and hurried, but precious, moments during which succour may be available, and securing that brief interval for the use of more promising means, or for others which are yet fairly open for judicious experiment.

There is one feature in this inquiry to which the Treatment Committee direct particular attention. It appeared to them that a most interesting line of investigation, promising valuable and instructive practical results, was opened by tracing the success of certain modes of treatment under which, according to their analysis of the evidence, the stage of collapse was avoided, and the far less dangerous alternative of consecutive fever was accepted.

It is much to be desired that a more extended body of evidence should be accumulated on this important topic, to which a scrupulously careful analysis should be applied. The prospect of discovering truths of high practical importance by this investigation is enhanced by the statement of certain corroborative facts enunciated in the Report of the Scientific Committee.

Statistical Tables are appended to the Report of the Scientific Committee, to which the Council desire to direct especial attention, as they exhibit a compendious summary of the extent of the epidemic, its duration, its comparative mortality in different districts, and at different ages.

In concluding our Report, and thus bringing the duties of the Medical Council to a termination, we most earnestly, but respectfully, urge upon the Government the paramount importance of pursuing with unabated diligence that path of investigation which Science sanctions, and into which the circumstances of the late epidemics had directed and guided us.

That which has been so repeatedly and wisely urged regarding the removal of accumulating filth, and the correction of nuisances, during intervals comparatively free from disease, may be pleaded with equal truth as to the necessity of an uninterrupted continuance of scientific inquiries during the same seasons of immunity, from which alone can we reasonably expect to obtain the requisite data for a true theory of the causes, or a wise plan for the cure of any future epidemic.

From regarding the future necessity for continued and competent investigation, the Council gratefully recur to the assistance they have received under your presidency. The members cannot separate without recording the deep sense they entertain of the kindness and courteous attention with which, on all occasions, you have been pleased to accept their suggestions; nor can they refrain from expressing their regret that political changes are removing you from an office with which your name will remain identified, and from the administration of laws which you have given so much pains to establish.

JOHN AYRTON PARIS,
Chairman.

General Board of Health,
July 26, 1855.

LONDON:
Printed by George E. Eyre and William Spottiswoode,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

GENERAL BOARD OF HEALTH.

APPENDIX V.

TO THE

SECOND REPORT

ON

QUARANTINE.

REPORT of Dr. W. H. BURRELL on the PLAGUE of MALTA in 1813.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1854.

(39)

The General Board of Health, Whitehall,
5th June 1852.

Sir,

I am directed by the General Board of Health to convey to you their sense of the value of the report presented by you to the Lords of Her Majesty's most Honourable Privy Council, stating in detail the reasons for the opinions given by you as member of a Board of Inquiry assembled at the office of the Army Medical Department, on the subject of yellow fever, and which the General Board have inserted in the Appendix to their Second Report on Quarantine.

The Board desire me further to express their hope and belief, that those reasons will assist in diffusing juster views on the mode of propagation, not only of yellow fever in particular, but of epidemic diseases in general; and I am therefore to request that you will favour them with any assistance which your observation and experience may enable you to render, with a view to extending a knowledge of the science of prevention in reference to Plague, and leading to a practical reform in quarantine.

I have, &c.,
(signed) C. Macaulay.

W. H. Burrell, Esq., M.D.,
Principal Medical Officer, Malta.

Malta, 8th July 1852.

Sir,

I have the honour to acknowledge the receipt of your letter of the 5th ultimo, conveying the favourable opinion of the General Board of Health on my report on yellow fever, and requesting any remarks I may be able to furnish with reference

to plague; and, in reply, beg you will express to the Board the value I attach to their approval of my performance, and the pleasure I shall have in forwarding to them a paper on the plague of 1813 in this island, which is now nearly ready.

I have, &c.,

(signed) W. H. BURRELL, M.D.,
Staff Surgeon, P.M.O.

C. Macaulay, Esq.,
General Board of Health, London.

PLAN OF VALETTA AND ITS HARBOURS.

1 Città Vecchia
2 Casal Balzan
3 Ira
4 Attard
5 Musta
6 Naxxar
7 Gargur
8 Bircarcara
9 Curmi
10 Lucca
11 Tarscien
12 Paola
13 Zeitun
14 Asciak
15 Gudia
16 Kircop
17 Mkabba
18 Safi
19 Zorrick
20 Stagneau
21 Grandi
22 Zabbarg
23 Dingli

Villages of Malta.

	Attacked			Attacked	
Sliema		7th May	Gudia		17th May
Tarscien		7th „	Mkabba		21st „
Zebbug		25th „	Lucca		25th „
Zetun		24th „	Zabbar		30th „
Attard		22nd „	Bircarcara		27th „
Carma		22nd „	Floriana		26th „
Carpicuan		21st „	Vittoriosa		25th „

The Portion of Floriana so near to Valetta would go far to prove that intercourse had little or nothing to do with the spread of the Disease or its appearance could not have been so long delayed.

A. Burmola
B. Vittoriosa
C. Cerradino
D. Isola Point
E. Floriana
F. Pieta & Messida
G. Sliema

Scale of Six Inches to a Mile

Day & Son, Lith.rs to the Queen

REPORT

ON

THE PLAGUE AT MALTA IN 1813.

My Lord and Gentlemen,

The island of Malta lies between Sicily and Africa, in latitude 35° 54′ north, and longitude 14° 34′ east. It is about seventeen miles in length by nine in breadth. The surface is diversified by hill and vale, the highest point rising about seven hundred and twenty feet above the level of the sea, while a part of the valley, at the head of the grand harbour, is a few feet only above the water. Limestone of various density forms its rocky base, which in many places appears almost bare, while, in others, its gentler declivities are covered by terraces, on which the scanty calcareous soil has been collected, in order to extend the area of cultivation. In some of the valleys the soil is deeper, and partakes more of an alluvial character; but in one or two spots only can it with propriety be designated as marshy. The villages, or casals, into which the great bulk of the rural population is congregated, stand, with few exceptions, upon high ground, and the habitations of the dense population in the various sections of the capital are, for the most part, favourably situated as regards elevation. The climate of this island is considered healthy. The mean temperature of the first quarter of the year is 57°; of the second, 67°; of the third, 79°; and of the fourth, 68°. The average fall of rain is about seventeen inches, and occurs chiefly in winter; the period from April to October being remarkably dry. As summer advances, the ground becomes parched, under the influence of a powerful sun. Vegetation languishes, or is checked. The winds are light, or long calms prevail, which are only interrupted by the oppressive sirocco. With the first rains, in October, the temperature speedily changes, the herbage assumes a fresh verdure; and the inhabitants, who had sought the shade as a protection from the scorching sun, now bask in the rays wherever houses or walls afford them shelter against the cooler northerly winds.

The formidable fevers, which led to the desertion of the casal San Paolo, on the border of the wet ground at the head of the

grand harbour, show that the salubrity of Malta is due rather to the general elevation and dryness of its soil than to any peculiar advantages of climate.

The island was ceded, by Charles V. to the Order of St. John, in October 1530. The incessant hostilities carried on by this martial order against the Ottoman power, then at its height, caused Malta, in turn, to experience the horrors of war; yet, during the alternate invasions, successes, and reverses of the next 145 years, the population suffered only four times from plague; namely, in 1592-3, 1623, 1655, and 1675-6. As the fanaticism and resources of the belligerents became exhausted, the Maltese turned their attention to the peaceful occupations of trade and agriculture; and when the island surrendered to the British, in September 1800, the supremacy of our flag secured full protection in these pursuits, when the coasts of Italy, France, and Spain were blockaded. Malta, in consequence, became "the emporium of "commerce in the Mediterranean;" merchants and refugees in great numbers resorted to it; and the population of its towns was augmented by many thousands, who found lucrative employment in its abundant prosperity.

"One of the most material branches of this commercial "intercourse," says Dr. Tully, "was the trade carried on "between Malta and the Levant; and the produce of the latter "hourly appeared in her ports. In consequence of the frequency "of the plague, which for centuries past had existed in almost "every part of the Levant, the general quarantine precautions "were invariably resorted to, and, after due expurgation, both "ships and cargoes were admitted to pratique in Malta."

The consul at Alexandria had apprised the government, in January 1813, that plague prevailed in Egypt; and we may hence infer that quarantine had rather become more rigorous than undergone any relaxation in Malta at that time, for the brigantine "Nancy," which had two of her crew under plague on arrival, and the polacca, "Bella Maria," which had lost one by the same disease about the time of her departure from Alexandria, both arrived on the 28th of March, and were required by the authorities to leave the island the following day. They were both loaded with grain.

The brigantine "San Nichola," Antonio Maria Muscara, master, had also arrived on the 28th of March, 1813, with a foul bill of health from Alexandria, where the disease existed, having lost two of her crew on the voyage; "measures of "increased rigour were immediately resorted to; all arrivals "from the Levant were placed in the strictest quarantine, and on "the 29th of the same month, the captain and crew were "transferred to the Lazaretto, and the ship was placed under the

" immediate charge of health guardians."* The captain was attacked on the 1st of April, his attendant, a sailor, on the 2d, and both died on the 7th of April, in the Lazaretto. The public it is said became alarmed; the Government, in consequence, determined on sending the " San Nichola" back to Alexandria; and on the 10th, she took her departure with a fresh crew.

" The public mind," says Dr. Tully, " was now somewhat " tranquilized by the sailing of the ' San Nichola ;' but at the " moment they were thus indulging themselves in the fond hope " of security, this insidious disease was insinuating itself in every " angle of the city, *in places remote from the scene of its first* " *appearance.*"

The " Giornale di Malta," of the 31st of March, takes no notice of these occurrences, nor can I find any allusion to the subject of plague, in the following weekly numbers, until the 12th of May.

The first case *recognized by the Committee of Health as plague* occurred on the 14th of April, in the daughter of a shoemaker, named Salvatore Borg, residing in Strada San Paolo (No. 227); a few hours after her death, on the 19th, the wife was attacked; and on the 30th, a son, four years of age, was taken ill. The wife, after being prematurely delivered of a seven months' child, died on the 4th of May; and Borg himself was seized with the disease on the same day. Inquiry was then made for other cases, and two suspicious ones were found. Nevertheless, in the proclamation of the 5th of May, " The Board of Health observes with pleasure, " that from the reports which, during the present meeting, have " been received from the various medical practitioners, both civil " and military, it appears that this city is at present free from " any contagious malady, excepting only the family of Salvatore " Borg (now in the Lazaretto), respecting which the board " hitherto sees no reason for diminishing the suspicions it has " entertained."

According to the " Giornale di Malta," of the 12th of May 1813, which reports these attacks in the Borg family, only three persons died under suspicious circumstances in the whole population, including the shipping, military, and prisoners of war, between the 14th of April and the 11th of May.

Dr. Tully also states, that " until the 19th (May), the advance " of the disease was slow, and many even began to doubt the " existence of plague in the island."

The " suspicions" of the board seem to have arisen during the illness, or after the death of, Borg's wife; for the daughter's disease was considered by a very able physician, Dr. Leone

* Tully, p. 38.

Gravagna, who visited her on the 16th of April, as "putrid "typhus;" and, in consequence of this opinion, the body was carried to the church and buried in the usual manner. Though the mother's case seems to have been more decided, even her corpse was carried to the church; but a conference of physicians having decided that her disease was plague, the body was removed, under a military escort, and interred outside the walls. On the 5th of May plague was declared to be present, and the survivors of this family, as well as every other individual proved to have had communication with them, were forthwith removed by order to the Lazaretto.

The only cases known as in any way connected with the disease in the family of Borg, are, 1st. Maria Agius, the midwife that attended Mrs. Borg, who was found dead in her room in Strada San Ursula, on the 6th of May, with "*some* signs of plague on her body." 2d. Grazia, daughter of Giovanni Batista Pisani, sexton of the church of St. Rocco, who, with her whole family, consisting of eight persons, was sent into Fort Manoel, in consequence of having communication with, and passing the night in the house of Maria Agius. On the 15th, she is reported as being affected with glandular swellings. 3d. Signore Delicata, brother-in-law to Maria Agius, who, being suspected, had also been sent into Fort Manoel, and is reported as having been attacked with fever and carbuncle on the 17th, which proved fatal on the following day. 4th. The father of Borg, eighty years of age, who was taken ill on the 8th, and died on the 9th, without having shown any symptoms of plague. Neither Dr. Gravagna, the physician, nor the several relations and friends, who, according to the Baron de Piro, were in attendance on Mrs. Borg, are noticed as having suffered.

Grazia and Delicata had been shut up in Fort Manoel on the 8th of May, and as the disease did not appear in the former until the 15th, nor in the latter before the 17th, there is no reason to suppose that these cases had any connection with the subsequent outbreak in Valetta; for between the 8th and the 15th, when Grazia was attacked, the only declared cases of plague were in two ships; one on the 9th, at St. Paul's Bay, eight miles distant; the other on the 14th, in a vessel about to sail for Lampedosa. On the 16th were reported, the deaths of a daughter and son of a baker, 92 Strada S. Christophoro; and of a Greek; the attack of a girl eight years of age in Strada *Pozzi*; of a man and his wife in Strada St. *Giuseppe*; and a girl of fourteen in Strada St. Giovanni. On the 17th, no fresh cases. On the 18th, two new cases in Strada Pozzi: one in Strada St. Paolo, a death in Fort Manoel, another in Casal Gudia, four miles distant, and one attack and one death in the Veterans.

The cases in the Borg family, and those which immediately followed them, can only be looked on as the more prominent and decided ones in the beginning of May; for, in addition to a boy at Sliema, whose father afterwards died of plague, there was the death of a girl on the 5th in the Maltese hospital, so suspicious that it was alleged the body was burned; the death of a boy, 150 Strada San Paolo, on the 7th, the whole of whose family was moved to Fort Manoel; a case at the village of Tarxien the next day, which proved fatal during the removal of the patient to the Lazaretto; the attack of a boy at Birchircara, who was placed in quarantine; another in the Marina, and on the 9th a young man in Strada Saluto, both of whom were sent to Fort Manoel.

All these cases were sufficiently suspicious to be placed in quarantine; but the Committee of Health conceiving (Dr. Calvert) that they had the disease in their power, remained in that belief till the 16th, when no further question could arise as to its diffusion. This unwillingness to proclaim the disease existed at a still earlier period, for the Baron de Piro (p. 13.) mentions the well-marked cases of three servants of a friend, and the death of a priest, about the 22nd of April, none of which occasioned alarm or led to any precautions.

I can neither trace from public documents, as Dr. Tully says can be done, "the attack of many near relatives," nor can I find that "the malady displayed itself by an uniform and faithful progress," according to the same author, characteristic of contagion. The relatives of those who suffered were considered "suspected," and placed in quarantine; intercourse with the diseased being, I am informed, more frequently presumed than proved. That many of these were attacked is certain; but as they had been exposed to the same local influences, no sufficient reason can be adduced for attributing such attacks to intercourse.

The statements of Dr. Tully, that "some of the health guards* "of the 'San Nichola' were among the first attacked," and that "the persons who were next and in succession attacked, were those "who made purchases of susceptible goods from the shoemaker Borg, "and who themselves traced their disease to this very source," (pp. 50, 51,) are unsupported by any official or other admissible evidence, and must be coupled with that loose hearsay testimony on which this author frequently rests important conclusions.

According to Luigi Borg, the youngest son, who is still living, neither his grandmother nor his two uncles Antonio Borg and Giovanni Bonnici were attacked, though they visited the family, and were in consequence sent to the Lazaretto. I think it not

* Mr. Garcin, the very best authority, contradicts this in the most unequivocal terms. Six guardians, Mr. G. states, were employed in this duty, a number offering little security, under promise of reward, for any concealment.

improbable that the great number attacked bearing the name of Borg may have tended to strengthen the common belief that the shoemaker of that name was the cause of the introduction and spread of the disease; and it may be well to explain that this name is to be met with in nearly every part of the island, predominating much in the same way as Smith in England, or Jones in Wales. Excepting the members of the shoemaker's family, however, it does not appear in the bulletins till the 22*d of May*, from which date up to the end of the epidemic it is to be found more frequently than any other.

The Committee of Health having reported "the public health to be in imminent danger," efforts were made to trace the disease from the "San Nichola," or Lazaretto, to the house of Borg—a distance of fully a mile. It was said that Borg had had contraband dealings with the health guardians, who had watched in boats alongside the "San Nichola," with her ports closed. Sliema is mentioned as the place of deposit of the articles alleged to have been stolen from the San Nichola, apparently because a public-house there is said to be the resort of persons from the quarantine ground; and an anomalous case of disease (which proved fatal on the 7th of May) in a boy there, although pronounced by the Committee of Health not to be plague, seemed to furnish a connecting link eagerly laid hold of by a population believing that, without importation, the disease could not exist. It is not alleged that Borg had been seen with the guardians after the arrival of the "San Nichola," nor is there any evidence to prove that the latter had left their very responsible duty at a ship, about which there was so much public alarm, to carry on a petty, but to them most dangerous smuggling transaction with a shoemaker.

Such was the current opinion at the time, and it prevails at the present day. Dr. Tully gives it as the only one, but the Baron de Piro, in his excellent account of the plague, published in 1833,* says, "I cannot confirm it, on account of the following circumstances: 1st. It appears by the deposition of the captain and crew of the 'San Nichola,' that the port-holes had been shut and secured in the course of the voyage.† 2d. The new crew, embarked to take her back to Alexandria, arriving there, and, after having disposed of their cargo, returned to Malta, without a single individual having been sick. 3d. The British consul in Alexandria,

* "Ragguaglio Storico della pestilenza che afflisse le isole di Malta e Gozo negli anni 1813 e 1814 dal Barone G. M. De Piro—Livorno 1833.

† Mr. Garcin, then Captain of the Lazaretto, informs me that additional fastenings were made after arrival, and before the captain and crew left the vessel for the Lazzaretto, and that no communication could have taken place except by the guardians, and *that* he utterly discredits.

"to whom the said ship was consigned, assured our Government by "letter that no part of the cargo was deficient."

Sir Thomas Maitland, in his despatch of the 8th of April 1819, to Lord Bathurst, says; "As far as I have been able to ascertain, "I think I am warranted in stating, that it (the plague), was "brought into Malta by a ship from Egypt, and conveyed out of "that ship by a person smuggling some *leather;* this person and "his family were the first sufferers from it."

Dr. Tully seems to have given credit to this story, but the Baron de Piro (a Maltese), who would appear totally to disbelieve it, says, "I consider it proper to state that Dr. Tully, "by false accounts given to him, erred in characterizing the "shoemaker Borg as a noted smuggler; for, by common consent "of those who knew him, he was always regarded as a respect-"able artisan." Moreover, Dr. Hennen says, "in a letter now "before me, the President of the Board of Health candidly "confesses that the only clue to inquiry as to Borg's guilt was "his dying exclamation, 'Oh! the linen, the linen.'"* "Nor "is it likely," observes the Baron de Piro, "that the guardians "having the penalty of death before them, and the knowledge "of plague on board the 'San Nichola' should have ventured "on leaving their post; it is more reasonable to imagine that "if they abandoned it at all, for the purpose of theft, either "they went on board some of the other vessels, or they had "stolen infected articles from the Lazaretto. But without "wandering into idle conjectures and suppositions, I consider "it better for us to adhere to what has been uniformly attested "by several of my fellow citizens, and published by Dr. Naudi "and Dr. John Hennen in their respective works, namely, that "the plague, although not recognised as such, had been intro-"duced amongst us previous to the arrival of the 'San Nichola,' "by means of various pieces of cloth, which had been seen in "circulation in Valetta, enveloped in their original wrapper, "the manufacture of Alexandria; thus showing that, in contra-"vention of the quarantine laws, they had been brought into "commerce, without being previously purified. Dr. Naudi, in "his learned work, relates this fact in language the most positive." (p. 22.)

But to refer to the opinions of two very competent eye-witnesses of the occurrences of 1813, Dr. Calvert states, "nothing could bring to light the way in which the infection "was brought;" and Dr. Faulkner says, "it appears to me "little less than mere waste of time to take any pains in tracing

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* Linen formed no part of the cargo of the "San Nichola." (De Piro, p. 24.)

"this event to any particular instance of laxity in the depart-
"ment of public health."

The mere circumstance of the arrival of the "San Nichola," without proof that any of the first persons attacked among the population had come in contact either with those infected with the disease or infected articles, does not prove its introduction by that ship. The phrase "it must have been "introduced" is a gratuitous assumption, with which this matter-of-fact age is not inclined to rest satisfied. We must have adequate proof, and not simply the arrival of a ship with plague on board; which has happened over and over again without any injury to the population of Malta.

Dr. Tully says, (p. 223) "It is well known that merchant "ships from Alexandria, Smyrna, and Constantinople, with their "crews labouring under plague, have repeatedly, within the last "three years, entered almost every port in the Mediterranean "where the British flag was flying; and many such instances "took place during my residence in the Ionian Islands without "being productive even of alarm, much less of danger; and ships "under such circumstances remained for days in strict quarantine, "closely surrounded by guard boats, until the moment of their "departure, receiving every necessary assistance during their stay; "the same repeatedly occurred at Malta, and no apprehension "whatever was entertained by the Government, which trusted "with perfect confidence to the vigilance of the public officers."

I have examined every account I could find of this alleged introduction of plague, and nothing like proof is adduced in any of them; the whole appears to be pure conjecture; the invention, in short, of a panic-struck population to verify a preconceived opinion.

That the plague was in Malta; that the daughter of Borg was *the first case recognized by the Committee of Health*—that his wife, a son,* and himself were subsequently attacked by the disease; that packages of cloth from Alexandria, were previously to those occurrences circulated, are facts not to be disputed; but that Borg was a smuggler; that he had gone to Sliema or met the health guardians; that the latter had gone on board the "San Nichola," stolen goods, and sold them to Borg; that the packages of cloth from Alexandria had not been depurated, and, in consequence, plague communicated to the population, are simple matters of assertion, in support of which not a tittle of evidence exists.

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* Another son of two years of age, was attacked on the 14th of May, or two days after the death of Borg in the Lazaretto on the 12th: he recovered. The rest of the family, and the two Greeks who nursed Borg and this child, were reported well on the 15th of May.

The "San Nichola" arrived on the 28th of March, and disease, according to Dr. Hennen, "though not recognized as plague, "was in Borg's family on the 2d of April," and he, the supposed medium of communication, was not attacked until the 4th of May, thus showing, even had he met the guardians on the evening of the day of the arrival of the "San Nichola," a confusion or rather an inversion in the incubatory stage in the same family, which cannot be reconciled with a common sense view of contagion communicated from without, since the first and chiefly exposed was the last to suffer, though undoubtedly susceptible of the disease.

The following facts communicated to me by Dr. Bardon, the best living authority in Malta, on the plague, prove that cases of the disease occurred in Valetta previous to those in Borg's family; if not before the arrival of the "San Nichola." Dr. Bardon states that "about a fortnight previous to the attacks "of plague in the family of the shoemaker Borg, residing in "Valetta, I was called to a Sicilian living in a *small room*, "No. 46, Strada San Dominico, who, in addition to symptoms "of gastric fever, presented a bubo in the right groin, which "suppurated, and was opened by me, and at the end of fifteen "days the patient was quite well: this case, in my opinion, was "one of plague. About the same period that I attended the "Sicilian, I was called to see a woman living in a *small room*, "at 75 Strada San Ursula, who was labouring under fever, with "severe pain of head, and vomiting. In a few days a carbuncle "appeared on the outer side of left knee; the symptoms became "aggravated, and on the 7th day the patient died of plague."

Besides, corroborative evidence is still extant that there was no precise information, either as to the previous state of the public health, or the commencement of the epidemic in 1813, there being many graves in the vaults of the churches of Valetta, Floriana, and Burmula, secured to prevent disturbance by iron bars, which contain the bodies of persons who had died for several weeks previous to the disease being declared.

There is then no proof that the plague of 1813 was introduced into Malta. The disease was already in the island when the "San Nichola" arrived; and that an epidemic influence was wide spread in 1813, I shall presently show.

"Many gross errors," says Dr. Hennen, "were committed at "first (both by the public authorities, and the population) from "ignorance of the real nature of the disease, and from dread of "the quarantine police." From the date of Mrs. Borg's death (the 4th of May) all cases in the least suspicious were placed in quarantine; business of every kind was suspended; intercourse enjoined to be avoided, and all assemblages of people strictly

prohibited. On the 21st of May, all the infected were transferred to the Lazaretto; lights were placed at night on infected houses; the veteran guards were posted at the doors to prevent intercourse; the name of every person in the house was affixed upon the door, and the inmates were made to appear daily for the inspection of the deputies; the town was divided into eight districts; a market established in each; and vendors were even required not to fold their commodities in paper. Pincers were generally used for the exchange of every article between one person and another; and the Inspector General of Police directed the picking out by these means particles of hair, straw, feathers, &c., in maccaroni and other articles sold.

It will be further seen by reference to the proclamations, p. 78, that the restrictions were made more and more severe in proportion as the cases increased. On the 1st of June, the deputies and guards were instructed to prevent communication, not only between the different districts, but between the different families in each district; and on the 24th of June all communication between the towns and villages was ordered to be cut off; allowing only the officers of Government and such as procured passports from government to go through the barriers.

Dr. Calvert says, "almost every human means were put in "force, in conformity with the popular doctrine of pestilential "contagion, * * * but all was to no purpose. The disease "seemed to laugh at their exertions, while it jumped from house "to house, and from street to street. Those who had no com- "munication together, as well as those who had, fell alike victims "to its fury;" and at length he seems to have considered that "a single infected person is sufficient to contaminate the air of "a whole city."

The official bulletins for 1813 omit to notice the residence of some of the first cases; but I have been able to trace the great majority of those which occurred up to the 31st of May, and find that eighteen streets of Valetta, Floriana, and Cospicua, and Vittorisa, situated on the other side of the grand harbour, as also ten villages had been attacked, between the 12th and 31st.

In May plague had reached localities, some of them several miles apart; yet it was believed that all this had been effected by a single individual, who did not die for six weeks after his alleged exposure. Fifteen of the streets infected during this month were the worst in Valetta, in which the disease continued to linger, and six of the villages were among the most populous, two of them lying lowest, namely, Curmi and Birchircara.

No less opposed to the doctrine of contagion is the circumstance, that while Strada San Paolo, the recognised *fons mali*, had only six cases from the 12th to the 31st, the streets "Pozzi,"

"Nicola," "Ospedale," and "Mandraggio," had sixteen, eight, twelve, and six respectively; and by referring to map No. 2, it will be observed that this presumed mode of extension is also invalidated by the few instances, comparatively, in which the disease attacked house after house; its march having been always interrupted by space, so that the consecutive cases often occurred at great distances, and in streets having no connection. But the progress of the ordinary fever of Malta* so similar in its march, in the same months, to that observed by the plague, renders a common cause for the progress and decline of both highly probable, and explains in another way,† the safety with which Sir Thomas Maitland, on the 4th of December, "proclaimed that "the plague was completely at an end; and allowed the whole "population of Valetta to mix together, the very day that a "strong case of plague had taken place within a mile of that "city." (Despatch to Lord Bathurst, 1819.)

On the 20th of December, "the town of Valetta," says Dr. Calvert, "was again thrown into the greatest state of "alarm by the occurrence of two suspected cases, both situated "not far distant from the gate leading to Floriana."

On the 14th January, the day on which the clean quarantine expired, a sudden death occurred at Casal Nasciar, which suspended pratique to the whole island for a few days; but on the 27th of January general pratique for the whole island was announced, and did take place on the 29th. It will be seen by the subjoined authentic extract from Dr. Bardon's Register, that the island was not even at this time free from the disease. In fact as many undoubted cases occurred and passed into the

* Average Number of Fever Cases during the months from April to October among the Troops stationed at Malta, in each year from 1816 to 1851 inclusive, compared with the Deaths from Plague during the same months in 1813, among the Civil Population.

	April.	May.	June.	July.	August.	Sept.	October.
Annual average of admissions (military)	20·8	24·9	47·1	82·5	75·4	70·4	34
Deaths from Plague in civil population, 1813	3	110	800	1,595	1,042	674	211

† In fact, it was season that here had mastery, not quarantine, which tended in every way to exaggerate the disease, and, in consequence, to exclude the light that would otherwise have broken upon the medical part of the community by watching the fevers among the troops; for in these they would probably have discovered the mitigated forms of the same fever that was devastating the more crowded and miserable civil population. "I myself saw," says Dr. Calvert, "but two cases of fever "unattended with pestilential symptoms of one kind or other." * * "The most "respectable of the Maltese physicians acknowledged to me that they believed every "case of fever that occurred during the season of plague was pestilential." (Med. Chir. Tran., vol. vi.)

Lazaretto after the 4th of December as during the first six weeks of the epidemic; and, from the great number of places whence they were transported, the number of persons employed in that duty must have been as likely to extend the disease, had that been possible, as at any previous period, yet we do not find a single case traced to this source. The number of recoveries in these last cases will also prove, contrary to Sir Thomas Maitland's assertion, that "the last cases were" neither "the "most violent," nor, "in the instance of the last hundred, by "much the most fatal." (Despatch of 1819 to Lord Bathurst.)

List of Patients admitted into the Plague Hospital of the Lazaretto, from the 13th of December 1813 to the 16th of February 1814.

MEN.

	Name.	Age.	Nation.	Admission.	Result.	Discharged.
1.	Salv: Sant.	1		13 Dec. 1813.	Cured.	1 February.
2.	Piro.	30	Portugal.	17 „	Do.	„ „
3.	Guis: Borg.	18		„ „	Do.	„ „
4.	Fran: Cilia.	17	Zebbug.	„ „	Do.	22 „
5.	Guis: Delto.	6	Do.	„ „	Died.	20 „
6.	Sav: Borg.	20		„ „	Cured.	22 „
7.	Scerri.	23	Zebbug.	4 Jan. 1814.	Do.	„ „
8.	Gius: Cini.	4		„ „	Do.	1 „
9.	Vin. Detto.	2	Do.	„ „	Do.	„ „
10.	Salv: Baldachino.	18		10 „	Do.	22 „
11.	Giov: Gatt.	17	Do.	17 „	Died.	30 January.
12.	Giov: Agens Reschid.	12	Floriana.	21 „	Do.	22 February.
13.	Mich: Ellul.	40		22 „	Do.	23 January.
14.	Giov: R. Ajat.	20	Ancona.	26 „	Do.	28 „
15.	Torn: A. Raschid.	20	Valetta.	30 „	Cured.	22 February.

WOMEN.

1.	Paola Sant.	28		13 Dec.	Cured.	1 February.
2.	Maria Farugia	35	Do.	16 „	Do.	22 „
3.	Maria Magro.	5		16 „	Do.	„ „
4.	Evang: Camelieri.	26	Valetta.	20 „	Died.	14 „
5.	Rafela Debono	64		4 Jan.	Cured.	22 „
6.	Grazia Cini.	30	Birchiscara.	„ „	Do.	1 „
7.	Grazia Schiaro.	23		„ „	Do.	22 „
8.	Mar: Delica	13	Do.	„ „	Do.	„ „
9.	Dorn. Mala.	43		„ „	Do.	1 „
10.	Maria Schembri.	33		17 „	Do.	22 „
11.	Cal. Borg.	7	Do.	21 „	Died.	22 January.
12.	Mar: Baldachino.	70		22 „	Do.	23 „
13.	Mad: Schembri.	8	Do.	27 „	Do.	22 „
14.	Rosaria N.	4	Valetta.	16 Feb.	Do.	19 February.

I certify that the above is a true extract from my register of the last cases of plague in the epidemic of 1813.

B. Salva Bardon.

A careful review of the whole of the occurrences, such as the nearly complete exemption of the better classes everywhere; the escape of those left in comparatively free intercourse, though in equally questionable dwellings; the arrest or mitigation of the disease by pure air; the much greater proportion of recoveries among the military and others provided with proper accommodation in houses or hospitals; and the great mortality in the poorer populations subjected to rigorous restrictions, and labouring under every social and sanitary disadvantage, have left on my mind a deep impression that no small share of the mortality in 1813 may be laid to the account of quarantine. Let us well consider the facts; that in a population, amounting to 47,654, inhabiting sixteen infected places, in all of which quarantine was comparatively lax, and in several nearly neglected, there were only 219 deaths; whereas in six other places, containing 44,247 inhabitants, subjected to the most refined system of restriction ingenuity could devise, 4,221 persons perished.

There is nothing so very different in the climate, or in many of the habitations and modes of living of the people of Malta, from those of the Levant, where plague is admitted to be indigenous, as to induce the belief that they should be exempt from the disease. On the contrary, a careful investigation excites surprise that this island should not have been more frequently visited by Plague. Whatever may be the salubrity of its climate, we cannot believe that it enjoys any special exemption from that occasional distemperature of atmosphere extending over large portions of the globe, about the same time, and giving rise to different forms and degrees of disease with different people according to their respective local peculiarities. Hecker (p. 240) in speaking of the sweating sickness in England in 1528, says: "As soon as the occurrences of this unfortunate year could be "more closely surveyed, a conviction was at once felt that it was "one and the same general cause of disease which called forth the "poisonous pestilence of the French camp before Naples, the putrid "fever among the youth of France, and the sweating sickness in "England, and that the varying nature of these diseases depended "only on the conditions of the soil and the qualities in the "atmosphere in the countries which were visited."

That an epidemic influence extended far and wide about this time is obvious. In the beginning of 1812, the plague broke out in Constantinople, then in Smyrna, then in Cyprus; in August 1812, the yellow fever broke out in Murcia; in January 1813, the British Consul apprized the Government of the presence of plague in Alexandria; on the 28th of March following, the public health of Malta was "considered in imminent danger," not from

the extension of an epidemic influence, which a careful study of the laws of epidemic disease might have pointed out, but from the cases of plague on board the "San Nichola;" and in June a suspicious fever prevailed in Gibraltar, which, in July, was recognised as the yellow fever. We have had repeated evidence of a similar diffusion of the choleraic and yellow fever influences; we have seen the one and the other arrive in spite of the most rigorous quarantine, and for a season commit equal ravages.

Nor were indications of some similar influence absent from Malta, before as well as during the epidemic. Dr. Hennen states (p. 527), "The winter immediately preceding the plague was "mild, but during the whole period of the disease high winds "prevailed; those which were most so were from the north-west, "and it was a coincidence constantly observed, that on those days "the winds blew strongest the number of attacks and deaths were "always greatest. The rains in the Plague year fell *early*, and "*were copious;* this, however, caused no alteration whatever in the "progress of the disease. For four or five years preceding that in "which the plague raged, sudden deaths were much more frequent "than ordinary, and during the twelve months immediately "preceding, and especially for the last month of the period, the "increase was still more observable, insomuch as greatly to excite "public observation and alarm. Canine madness during these "years prevailed with a frequency and violence never before ob-"served, and many individuals perished in a state of hydrophobia. "Apoplexies and palsies were increased in a remarkable degree; "and intestinal worms, tæniæ, ascarides, and lumbrici, were never "so general or so numerous in the memory of man. *In this state* "*of the public health* the contagion of plague was *introduced* (?) "and spread among the people."

If Malta, with its rigorous quarantine has not been able to keep out small pox and measles, which are of frequent occurrence, how are we to expect that it should be able to exclude the plague, the spontaneous origin of which is much less questionable? If this island has been visited in seven different years by the plague, this is sufficient to prove that the disease can take root, spread, and maintain its ground in spite of the most strict and best organized quarantine.

The long absence of any extraordinary disease especially dreaded for its fatality, has with the bulk of mankind been held a proof of its foreign origin. To this day not a few medical men advocate and encourage this belief; and as relates to Malta there is scarcely a native doctor who is not firmly convinced of the imported and contagious nature of plague. It is not, therefore,

surprising that an ignorant people should have adopted an opinion forced upon them by the influence of rank and intelligence, and, even as it were, at the point of the bayonet; for it seems to have been little less dangerous than treason, for any one to evince a doubt on the subject. I believe, however, it was no seeming submission to authority, it was an unshakeable conviction from the Governor downwards; for I have met with few, whether English or Maltese, inclined to qualify the opinion they held in 1813: namely, that the plague is imported, only spreads by contact, and that there is absolute security in isolation.

It is amusing to listen to recitals of how the disease was communicated by a pair of new shoes, which had not hung for a fortnight before being worn, the shoemaker having died intermediately; how a piece of beef or money had not been immersed long enough in vinegar and water; how a doctor had forgotten that he had touched a bubo with the end of his cane, and fell a victim; how an unfortunate painter in going to his work had trodden upon a piece of old rag in the street, thrown from an infected house, was alarmed by the exclamations of the horror-struck lookers on, and though leaving his shoes, was attacked, and infected his whole family; how even cats were accused as the medium of communication; for in no case do the Maltese fail in tracing plague to contact in some shape.

To give credit to the accounts detailed to me by men otherwise intelligent, would be to believe that everything in the neighbourhood of an infected person was charged with a subtle poison which neither distance, purification, nor time was effectual in destroying. The comment on all these wonders is, that notwithstanding the most paternal injunctions of the Government, and the most stringent restrictions on intercourse the world ever perhaps witnessed;* together with extreme caution, dictated by fear, on the part of the inhabitants; still the disease increased, attained its acme like common epidemic fever, and at the proper season declined and disappeared, except in Casal Curmi, which, surrounded by double walls and cordons of troops, continued to suffer from a disease, which would have been more successfully opposed by the free dispersion of the people.

We must believe that Sir Thomas Maitland, and his predecessor, General Oakes, acted from a sincere conviction that the disease could only spread by contact; and we cannot, therefore, but respect the decision and activity displayed in the measures used for its repression. To cut off all communication by barricading

* See Note A. at the end of this Report.

the approaches was obviously the true means of arresting a disease extending by contact. But within the devoted district, the plague was fearfully increased in frequency by this measure. The fear of contagion drove every one within the precincts of his own dwelling; and here, under every circumstance that could depress the mind, or disease the body, this unfortunate community, accustomed to live much in the open air, awaited a doom which was hurried on by the very means (seclusion) employed for their protection.*

At an early period of the epidemic (21st May) the healthy members of infected families, as well as the suspected and diseased, were transferred to Fort Manoel and the Lazaretto. The permanent accommodation here being soon found insufficient, small wooden houses, or *barrache*, as they are called, were erected in the ditches of the fort; and subsequently similar ones were placed in the ditches near the Porta de Bomba and other spots about the bastions at Floriana. The master carpenter, Carlo Mifsud, who superintended the erection of these huts, informs me that they were built against the wall, about twelve feet square, formed of $\frac{3}{4}$-inch boards, with sloping roof, and with small windows. They were placed about twelve feet apart, with bars between to prevent communication, but without furniture or convenience of any kind excepting what might be provided by the inmates.

"All these receptacles of human misery," says the Baron de Piro, "presented but desolation and death;" and, judging from their plan and material, altogether unsuited for the climate, it is probable that the change from the town was in many instances greatly for the worse, more particularly to those in the ditches, the accumulated heat and stagnant atmosphere in which must have been insupportable. It is certain that the number attacked in the latter was very great, including the whole of the becca-morti (except one) employed in Valetta and Floriana. Nor could those at Fort Manoel fare much better; for exposed to an unmitigated summer sun, and the reflected heat from high walls and

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* In 1813 they seem to have followed very closely the measures adopted in the plague of 1676, by far the most fatal that has yet visited the island, no less than 8,569, or, according to common belief, 11,300, out of a population of 60,000 having perished. The disease commenced in December 1675, abated in February and March 1676, attained its height in June and July, and declined about the middle of August. By a census taken at the time in Valetta, 12,144 persons were found in 2,700 families. This dense population was required under the penalty of death strictly to segregate themselves in their own houses. Crowds of the infected were sent to the Lazaretto, and the suspected placed on board ships in the harbour, where nearly all died. It visited every part of the island, and, as in 1813, it seems to have been almost confined to the lower orders, the deaths of only ten gentlemen and seven clergymen being noticed.—"Historia "della Sacra Religione Militare de S. Giovanni Gerosolimitano. Venezia, 1715," *Passim.*

equally arid ground, the suffering during the day could scarcely be compensated by the sea air at night. The great object of these arrangements appears to have been to limit contagion; all else was subservient to that, and the result was as mischievous as many similar attempts to arrest the progress of epidemic disease.

Nor was the necessary hospital accommodation provided: that at Fort Manoel consisted of two small casemated ground-floor barrack-rooms, in which 234 persons died in June; yet this seems to have been the best. The three hospitals in the ditches at Floriana were of similar construction to the barrache; and in these the mortality in July and August amounted to 791. The Lazaretto was the only place, Fort Manoel excepted, that held out any reasonable hope of succour in such a visitation; and it proved so, the attacks and deaths here, according to Mr. Garcin, being, even in the tents, inconsiderable compared with those in the barrache. The families in the permanent buildings, Mr. G. states, suffered very little.

Mr. Thornton, Auditor-General, has furnished me with details of the sums expended in a daily allowance (about 3*d.*) to every individual detained in Fort Manoel, and of the provisioning of the hospitals,* by which I am enabled to deduce that the greatest number of persons in barrache, tents, and the hospital in the ditch at Porta de Bomba (on the 24th, 25th, and 26th of July) was 250; at Fort Manoel, about the same period, 935; and in the middle of August, 1,059. Later in August the number in the latter, and the Lazaretto, including 56 in hospital there, amounted to 1,389; on the 31st to 1490; on 10th September to 1,965; and on the 30th to 2,064. Taking the days of the greatest expenditure, namely, 17th and 22d July, in the hospital in Porta Reale ditch, and in that of Porta St. Anna, the number of sick about that period in the two largest hospitals would appear to have been 200; which, with those in Fort Manoel and the Lazaretto, would give about 300 under the disease; of whom from 30 to 50 died daily. Of the management of these hospitals and the chances of recovery we may form some idea from the following:—

"The result of about half an hour's visit to the Maltese pest "hospital," says Dr. (afterwards Sir Brook) Faulkner,† "on the "2d of June, may convey some faint idea of the sufferings and "privations to which those labouring under this horrible disease "were subjected. These miserable creatures lay within a very short "distance of each other, five or six on the floor of the same room; "twenty-eight of them were attended by two convicts. They had

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* See note C. at the end of this Report.
† Ed. Med. and Surg. Journ. vol. x.

"no change of linen, and were therefore obliged to lie either "without shirts, or in their foul every-day clothes."

ATTACKS and DEATHS among the Populations of Valetta and Floriana from the 5th of May, when Plague was declared, to the end of October 1813.

Places of Attacks and Deaths.	May.		June.		July.		August.		Sept.		October.		Total.	
	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.
In Houses in Valetta .	72	41	344	160	463	326	207	105	35	7	8	2	1455	641
In Houses in Floriana .	2	2	122	83	281	194	58	27	20	3	9	4	492	313
In Fort Manoel	16	35	23	234	16	26	.	.	.	.	1	.	56	295
In Barrache at Fort Manoel	.	1	5	49	51	18	42	.	16	.	4	.	118	68
In Barrache at Floriana .	.	.	26	5	76	12	60	12	53	4	5	1	220	34
Plague Hospital of Valetta (in the ditch) .	.	.	.	28	6	262	8	149	3	39	.	1	17	481
Plague Hospital at Floriana (in the ditch)	.	.	13	48	2	263	5	115	5	76	3	21	28	523
In Lazaretto .	2	3	4	6	7	5	.	22	13	24	20	26	68	86
In Hospital of Observation (in the ditch)	6	13	50	20	13	2	13	.	6	.	.	.	88	35
In Maltese Hospital in Valletta . .	.	.	.	2	1	2	4	1	.	.	.	.	5	5
Total . .	98	95	587	635	916	1110	397	431	151	153	51	55	2568	2481*

The impossibility of preventing the extension of the disease by the best organized system of quarantine, both in Malta and Corfu, showed that the calculation and foresight of the most vigilant were at fault; and that something more than segregation was required to stay its progress. Dr. Tully (p. 102), after describing the very complete arrangements for arresting the disease in the district of Leftimo, in Corfu, says, "Nevertheless "the great object was yet unattained, as the extension of the "contagion hitherto baffled all our efforts. The vigilance of the "public authorities was excited in the strongest manner; and I "immediately repaired to every place where disease broke out

* The difference in numbers between one Return and another in this Report arises from discrepancies in the Bulletins which it would be in vain attempting to adjust.

" anew ; but all was ineffectual ; for, at the very moment we had " formed the best grounded hopes of success, some unfortunate event " occurred to subvert the whole; and it not unfrequently happened, " when we had reason to be certain that every danger was securely " confined, it would suddenly start upon us, mocking all ordinary " efforts ; and not because it was invincible, but (as I have before " said) because we could not thus early arrive at anything like " perfection, more especially on the part of our subordinate agents ; " at this very period, when we supposed we had grasped the disease " with Herculean force, it escaped with all the changes of a Proteus."

All who have visited the villages of Corfu, and seen the squalid, aguish aspect of the inhabitants, and their small dark, filthy cabins, will be able to appreciate the probable effects of the following means of arresting a febrile disease. " The character of " the people we had to contend with," says Dr. Tully (p. 112), " left us still in the most anxious doubt; for although sentries " were placed everywhere, both day and night, assisted by frequent " patroles, we still apprehended that attempts at clandestine com- " munication would be made ; and learning, for the first time, from " His Excellency, that a similar infatuation to incur disease existed " in Casal Curmi, in Malta, where the inhabitants were not only " walled in, but locked within their respective dwellings, I deter- " mined upon having recourse to the latter method; and in addition " to the security granted by the presence of the guards, I caused " each house to be locked every evening, *previous* to sunset, and " the key of each door placed in a contiguous secure situation, " where it remained until *after sunrise*, when the doors were " opened for the purpose of general ventilation and for receiving " the daily supplies ; so jealous was I of this duty that it was " invariably executed in the presence of an officer of health ; and " further, when the nature of the building led me to apprehend " danger by means of the windows, I then caused them to be " barred ; nor was I satisfied with the execution of these orders, " but the whole came almost daily under my own inspection ; " thus it might be said that the plague was hermetically sealed."

According to Sir Thomas Maitland, a zealous perseverance in these means, during four months, sufficed for the extermination of a malady of which Dr. Tully says, (p. 90)—

" Reflecting upon the nature of the disease, which presented " itself for our examination, the poverty of the inhabitants " amounting almost to absolute want, the natural unhealthiness " of the whole district during the autumn; considering also that " these people had but recently recovered from the effects of a " remittent fever, which had been most severely felt in every " part of the district; the village, although elevated, being nearly " surrounded by marshes, inhabited by a peasantry wholly " unconnected with commerce, removed from the sea-shore, and

"in the very heart of the district, no disease having been "discovered in any other part of the island, all combined to "impress upon our minds that the disease before us was the "offspring of the soil; nevertheless, conceiving that it was not "only of a malignant, but also of a contagious nature, we "considered that it was that particular description of disease "which demanded the strictest measures of precaution."

Sir Thomas Maitland states "it was almost a proscribed idea that plague existed there at all," as well with the inhabitants as the physician of the infected district, and it never seems to have occurred to him that four months might well comprise the whole existence of an epidemic.

The following Table, showing the number of attacks and deaths by Plague in Malta from the 18th May to the 30th of October 1813—after which date no more bulletins were issued—is an accurate transcript from these documents.

Day of the Month.	May.		June.		July.		August.		September.		October.	
	Attacks.	Deaths.	Attacks.	Deaths.	Attacks.	Deaths.	Attacks.	Deaths.	Attacks.	Deaths.	Attacks.	Deaths.
1	. .	. .	13	18	43	42	27	50	13	37	11	12
2	. .	. .	17	13	34	44	41	48	53	33	10	16
3	. .	. .	11	19	46	53	39	27	23	32	4	15
4	. .	. .	31	16	53	43	22	47	15	28	9	7
5	. .	. .	22	24	57	49	24	43	33	33	9	6
6	. .	. .	14	19	54	58	20	35	32	34	9	14
7	. .	. .	11	28	37	55	25	37	14	37	1	13
8	. .	. .	16	24	51	51	28	14	15	31	3	9
9	. .	. .	23	32	30	52	28	16	14	29	3	8
10	. .	. .	36	27	56	56	24	28	22	25	4	5
11	. .	. .	40	33	60	63	26	16	14	17	8	3
12	. .	. .	14	33	54	59	26	31	7	26	3	5
13	. .	. .	17	36	51	55	29	31	18	17	2	4
14	. .	. .	15	19	30	65	36	29	14	17	3	3
15	. .	. .	16	19	32	67	28	34	22	30	5	5
16	. .	. .	30	23	37	36	28	29	8	23	3	5
17	. .	. .	25	28	47	50	28	32	20	12	8	5
18	3	8	24	21	29	41	25	38	16	20	6	4
19	11	10	23	18	47	43	27	27	19	24	6	7
20	5	6	34	24	41	41	19	32	9	21	5	10
21	5	6	19	24	30	55	23	32	7	12	4	2
22	3	4	30	29	39	48	17	34	6	12	6	4
23	3	7	42	35	43	45	23	33	12	16	4	7
24	4	4	36	23	41	44	30	34	14	11	7	6
25	10	5	36	34	51	53	12	31	9	11	1	2
26	17	5	39	39	61	47	18	38	10	19	2	3
27	10	7	46	37	36	64	17	27	19	12	5	5
28	12	16	50	44	50	49	25	25	13	15	4	1
29	15	10	48	47	49	53	15	29	9	14	. .	5
30	16	12	44	53	38	63	20	28	11	16	. .	5
31	11	18	. .	. .	41	58	32	26	. .	. .	. .	. .
	125	118	822	829	1,368	1,602	782	981	491	664	145	196

The excess of the deaths over the attacks in this table shows, that, notwithstanding the severest penalties were enforced against persons concealing the illness of themselves or others, yet many cases of plague must have escaped the vigilance of the Committee of Health; for, upwards of one-seventh of the fatal cases became known only after the death of the patient; yet, in the most mortal epidemics, some of the plague-stricken recover. It would hence appear that neither the fear of punishment, nor the instinct of self-preservation in a population thoroughly imbued with the doctrine of contagion, could enable the authorities of Malta either to trace every case of plague, or to carry fully into effect the separation of the sick from the healthy; thus proving, in the very stronghold of quarantine faith, the utter failure of restrictive measures to exterminate pestilential disease.

I would direct attention in the following table to the deaths of four surgeons, so late as August and September, indicating that an epidemic, which for several months had been resisted by the husbands, or brothers, in daily intercourse with the sick, had almost simultaneously attacked their wives or sisters.

Except with surgeons and the better classes, the designation or employment of persons is not stated in the bulletins till the later months of the epidemic. It is, in consequence, impossible before this to discover how far the disease attacked those having direct intercourse with the sick. The deaths of six criminals at Fort Manoel in May and June, in addition to those attacked in the Grand Prison, are noticed, but whether employed as beccamorti does not appear.

TABLE showing Attacks among Persons supposed to be more peculiarly exposed by immediate intercourse with the Sick.

* Those marked with an asterisk do not appear a second time in the Bulletins, and therefore probably recovered.

NAME.	Employment.	Date of Attack.	Date of Death, or Result.	Street or Place.
Dr. G. Scifo	Surgeon	16 June	Recovered	S. Teatro.
Carlo Grech	Do.	22 „	22d June	Maltese hospital.
Salv. Bardon	Do.	4 July	Recovered	Fort Manoel.
Salverio Musci	Do.	14 „	16 July	Plague hospital.
Samuale Caruana	Do.	18 „ *	Unknown	S. S. Lucia.
Salv. Pisani	Do.	„ „	21 July	Vittoriosa.
F. Cortesi	Do.	27 „	6 Aug.	Plague hospital.
O. Luca	Do.	28 „ *	Unknown	Do.
Onoralo Deluca	Do.	—	1 Aug.	Do.
Franc. Castellana	Do.	—	5 „	Do.
V. Marciretto	Do.	5 Aug.	10 „	Do.
E. Santilli	Do.	8 „ *	Unknown	Do.
Luigi Mazzei	Do.	10 „	Do.	Do.
Felice Brignone	Do.	„ „	13 Aug.	C. Zebbug.
Domenica Brignone	His sister	„ „	„ „	Do.

Name.	Employment.	Date of Attack.	Date of Death or Result.	Street or Place.
Leone Gravagna -	Surgeon -	—	16 „	148 S. Mercanti
Emm Micalleff - -	Do.	—	29 „	C. Curmi
Anna Micallef - -	His wife -	29 Aug.	2 Sept.	Do.
Giov. Briffa - -	Surgeon -	„ „	30 „	Do.
Vin. Briffa - -	His wife -	„ „	—	Do.
Car. Ebeir - -	Beccamorto	8 Sept.	11 Sept.	Rabbato.
Gio. Tr. Falzon - -	Surgeon -	—	16 „	Do.
Ant. Falzon - -	His sister -	17 Sept.	18 „	Do.
Gaet. Zammit - -	Beccamorto	16 „	18 „	Do.
Car. Madrenza - -	Surgeon -	17 „	19 „	8 St. Guiseppe
Pietro Soliman - -	Beccamorto	20 „ *	Unknown	Lazaretto
Akae Imhammet - -	Servant -	—	3 Oct.	Plague hospital.
Guis. Portelli - -	Beccamorto	—	4 „	Rabbato
Lorenz. Corradi -	Do.	4 Oct. *	Unknown	Barrac.
Mar. Spiteri - -	Do.	12 „	16 Oct.	C. Siggieui.
Elia Adatt - -	Servant -	15 „	17 „	Lazaretto, servant to Jewish surgeon.
Sal. Gauci - -	Beccamorto	16 „ *	Unknown	Lazaretto.
Fran. Pace - -	Do.	—	18 Oct.	Do.
Guis. Martino - -	Cook -	17 Oct.	19 „	In Lazaretto
Francesco - - -	Servant -	—	8 Sept.	Plague hospital, Siggieui.
Vin. Micalef - -	Do.	—	5 „	Do.
Carlo - - -	Beccamorto	5 Sept.	8 „	Musta.

In this table I have given the names and dates of attack of all I can find who may be supposed to have been peculiarly exposed to contagion from the sick.

The lateness of attack of more than two-thirds of the surgeons and of all the beccamorti will not escape notice. The deaths of six surgeons in the Plague hospitals—a large proportion, probably—will also attract attention. But it may save hasty conclusion to keep in mind the long resistance to the disease of those individuals; the number of surgeons attacked in other places; the few altogether of the profession who suffered, compared with the great number employed—upwards of 100; also the unfavourable situation of these hospitals (in the ditches) as well as their crowded state and want of cleanliness; and the complete exemption of all the surgeons and servants in the military pest hospital, though, as Sir Brook Faulkner observes, the latter were "*necessarily in contact with the individuals who had the "Plague.*"

It is impossible to ascertain how many medical practitioners attended cases of plague; but of thirteen in Valetta and Floriana who report the recovery of patients under their care in July—five were attacked, of whom three recovered and two died. The subject of one of these deaths was Dr. Leone Gravagna, who

attended Borg's family; and it is stated by several most respectable contemporaries of his own rank, that he contracted the disease through money received from a carman, as he never visited any sick after Mrs. Borg's death.

Dr. Gravagna lived at 148 Strada Mercanti, near to the most infected part of the town ; another in Strada St. Lucia, a street remarkable for the disease ; a fourth, in a small shop and house 68 Strada Teatro. The second fatal case, Mr. Madrenza, had attended a case on the 10th, and died on the 18th of September. He resided in the same street (St. Giuseppe) as his patient, in which "towards the middle of September," says Dr. Calvert, "the contagion appeared to revive," and "several of the guards "and others were attacked."* By reference to the maps the situation of Strada St. Giuseppe will be seen to afford reasonable grounds for suspicion, that locality was not unconcerned in the revival of the disease.

Only three villages seem to have had medical men attacked, namely, Curmi, Zebug, and Rabbato. The first lost two at the end of August ; the second, one on the 13th of that month ; and the third, one on the 16th of September. Of three medical men in Vittoriosa, one was ascertained to have been attacked and died.

There can be no doubt that many others were employed in a population amounting to about 45,000. But whatever construction we put upon those cases, it may be well to consider the localities in which they resided as well as the mere circumstance of communication with the sick. The influence of the former probably manifests itself in the fewer attacks and deaths among those living in Valetta and Floriana than in the hospitals ; but it becomes more apparent by the fact, that in fifteen other infected places, towns, and villages, containing about the same amount of population, and having each, probably, from one to three medical men, no attack is recorded among them. Nor should we lose sight in any comparison of the aggregate accidents in the medical section of the population, of the amount of fatigue, anxiety, and exhaustion, suffered by those in towns, hospitals, and villages respectively.

Again, we find from twenty to thirty cases of plague treated in the Military Pest Hospital, and not one attendant suffered. This hospital is a detached, airy, and commodious structure, and was for several years afterwards the hospital of the regiment

* Med. Ch. Trans., vol. vi.

s tioned at Floriana. But here something more important is established; namely, the benefit of proper care of the sick, the majority of whom recovered.

Nor is the history of the Grand Prison, as compared with the ravages of the disease in the Barrache less conclusive; in the first three months of the epidemic an occasional case occurred on the ground floor, yet there was no general prevalence of disease, and among those better placed not one attack.

The influence of certain conditions is more manifest in the attacks among the expurgators between the 22d August and 15th October. The attacks were forty-eight, the deaths twenty-three; both far exceeding proportionally those in houses at Valetta and Floriana at the same period. These men were placed in nearly parallel circumstances to the convicts employed as beccamorti, *i.e.*, living in similar Barrache at Floriana, dressed in oil-skin, and engaged in laborious work in the worst nests of the disease, where either the death or removal of the inhabitants had in many instances left no person to communicate plague to them. In a more general purification, from the middle of November to the end of December, this class did not suffer. The concurrent atmospheric causes were then wanting—the epidemic had ceased.

The accidents then among those ascertained to have been directly or indirectly exposed to the disease were as follows:

	No. Employed.	Attacked.	Died.
Surgeons in Private Practice - - -	Unknown	10	7
Surgeons in Plague Hospitals - - -	Ditto	10	6
Beccamorti and Servants - - - -	Ditto	14	11
Expurgators, whitewashers, and carmen -	Ditto	48	23
Total - -	—	82	47

When did they consider they had "arrived at perfection" in the Plague of Malta?—Not till the arrival of Sir Thomas Maitland, on the 3d of October, about which time a decided favourable change in the winds, weather, and sanitary state of the inhabitants, is invariably experienced. Previous to this the plague had begun to decline, as the following rate of progression will show: "April, 3 deaths; May, 110; June, 800; July, 1,595; "August, 1,042; September, 674; October, 210; November, 53." "In Valetta alone," says Dr. Hennen, "it was as follows:— " April, 3 deaths; May, 48; June, 235; July, 616; August, " 275; September, 44; October, 2; after which no more deaths " occurred in the City" (p. 505); and a very similar progression

and decline occurred in the villages. The operation of a similar cause is shown in the number of towns and villages infected in the same months, being 1, 17, 25, 26, 17, 12, 12, and 4 respectively.*

The exertions of Sir Thomas Maitland were reserved for the disease in the villages, more especially in Casal Curmi. This unfortunate village had three deaths in May; fifty-six in June; 115 in July; 142 in August; but the deaths having increased to 181 in September, and continuing throughout October, though in considerably diminished numbers, a suspicion arose that the disease was kept alive by infected articles, which the inhabitants had secreted. "The knowledge of the above circumstance," says Dr. Tully, (p. 59,) "compelled His Excellency to have recourse to "the novel and extraordinary plan of converting a populous "country town into a species of Lazaretto, shutting the inhabi-

* Deaths from Plague among the Civil Population in the Towns and different Villages of Malta in each month during the Epidemic of 1813. According to Dr. Hennen.

The towns are marked *, and the villages †.

Towns and Villages.	Months.								General Total.
	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	
*Valetta	3	48	235	616	275	44	2	..	1223
*Floriana	..	2	142	472	172	83	26	..	897
*Vittoriosa	..	2	10	13	8	..	..	..	33
*Cospicua [or Burmula]	..	1	9	2	..	..	..	..	12
†Zebug	..	2	25	145	271	232	16	..	691
†Luca	..	1	22	18	1	..	..	..	42
†Birchircara	..	..	20	65	89	74	28	4	280
†Musta	..	..	1	8	15	8	..	..	32
*Notabile [and Rabbato]	..	1	2	9	6	10	8	8	44
†Curmi	..	3	56	115	142	181	98	19	614
†Zeitun	..	1	4	6	..	..	..	..	11
†Zabbar	..	1	6	28	9	..	..	..	44
†Gudia	..	3	2	1	..	..	..	..	6
†Sliema	..	1	1	1	..	..	..	..	3
†Lia	..	..	4	..	..	..	..	..	4
†Attard	..	1	..	1	..	..	..	..	2
†Micabiba	..	2	4	1	..	..	..	..	7
†Dingli	..	..	..	..	..	..	1	..	1
†Nasciara	..	..	5	3	..	..	..	..	8
†Zurrico	..	..	3	3	..	..	..	..	6
Messida	..	..	1	3	1	..	..	..	5
†Tarxien	..	..	..	1	..	..	..	..	1
Marina	..	..	3	1	..	..	..	..	4
†Siggieni	..	..	..	..	..	8	1	..	9
Bighi	..	..	..	1	7	8	1	..	17
Marsa	..	..	..	..	1	..	..	..	1
Calc Salva	..	1	1	..	..	..	..	..	2
Isolotto	..	..	..	..	..	..	1	..	1
Sopra Bast	..	..	2	4	..	..	..	..	6
Campo Santo	..	..	..	..	..	1	2	..	3
†Paolo	..	..	..	1	1	1	..	..	3
Port Manoel	..	38	235	71	21	..	..	..	365
Lazaretto	..	2	5	6	22	24	26	22	107
Coradino	..	..	2	..	..	..	..	..	2
Pieta	..	..	..	..	1	..	..	..	1
Total	3	110	800	1,595	1,042	674	210	53	4,487

104 died of Plague in the Island of Gozo in 1814.

" tants within their own precincts by the erection of double walls, " and by the establishment without these walls of cordon over " cordon."

By the kind assistance of Dr. Paolo Vella, the Syndic, and Dr. Gatt, together with notes taken by the Baron Azzopardi, an eye witness, I am enabled to speak with more confidence on the progress of the disease in Zebbug than in other villages.

In 1813 Zebbug had no case of plague till the 25th of May, and up to the 25th June only eight deaths in three or four families. On the appearance of plague in Valetta, the authorities of Zebbug divided the town into three districts, with three deputies for each, who attended the interment of the first victims, preceded by beat of drum and armed men. About the middle of June a civic guard was formed to prevent intercourse Curmi, with and subscriptions were raised for the support of the poor. On the 25th June a committee of health was formed to visit daily suspected houses, to call in medical aid, to distribute food and charity to the infected, and to place them under observation. Women were forbidden to loiter about the streets. Change of domicile, or entering any houses but their own, was strictly prohibited, and seclusion was enforced, from the 25th of July, by advice of the Proto Medico. Up to the 25th of August the sick and their families (except convalescents and orphans) were without hospitals or any other refuge than their own houses, in which they were now strictly segregated, the sentries in every street having orders to mark for quarantine, or even to shoot, the refractory ; but from this date the sick of the poorer classes were removed to 104 barrache, which the committee of health had applied for on the 7th of August. These barrache were erected in a level field of about one acre and a half at most, and without the shade of a tree to protect them from a scorching sun in the hottest season. In 15 days 189 died. Troops were stationed in Zebbug on the 29th of August, and more were sent in September, and these are said by Sir Thomas Maitland to have arrested the disease in a month, yet 107 additional victims were swept off by the end of September from an already decimated population, and nine more deaths are noticed in the bulletins, the last on the 26th of October.

Up to the end of July the number of attacks noticed in the bulletins is equal to deaths ; from that date to the end of September the former fall short by 113, showing that many were found dead in their houses—a conclusion borne out by the marks of the police still to be seen on dwellings in the village. That a great mortality also took place in the barrache appears from the following extract from a certificate by the Curate Scicluna, dated 28th September 1813 : " Having been employed the whole day

" in administering the Sacrament to the infected I could not " register the deaths on the proper day, the more especially as the " greatest part of them died in the barrache ; when, therefore, " the contagion ceased they were noted according to reports " obtained from their relations or neighbours."

Proof of the disastrous consequences of restrictions is furnished by the places under cordons and strict seclusion in September, namely, Zebbug, Curmi, and Birchircara. These villages, containing altogether 14,159 inhabitants, had 487 deaths in that month, while in the remaining population, numbering 82,244, enjoying more freedom, but in many instances under similar sanitary defects, the deaths did not exceed 187 in the same period, and 127 of these occurred in Valetta and Floriana, where restrictive measures were pursued unremittingly from the beginning.

The exemption of the soldiers composing the cordons in the villages considered so corroborative of the efficacy of quarantine by Sir Thomas Maitland directly proves the opposite. They were on the outskirts of the village at Curmi, at Birchircara, and Rabbato, with pure air both in their tents and houses, as well as when on duty, an advantage which was studiously withheld from the inhabitants. The thirty soldiers who arrived in Zebbug on the 29th of August were, it is true, quartered in the town, but in addition to daily out-door employment they were accommodated in a very well ventilated corner magazine or shop, with doors opening into two streets, that suffered little from the disease. The reinforcement in September was in tents. Rabbato, as miserable a village as Zebbug, had up to the 3d of July three deaths, all in one family. From that date up to the 10th of September, at intervals of a few days, sixteen more occurred, making in all only nineteen in a period of upwards of five months. The disease, Dr. Calvert says, re-appeared at Rabbato. In the following six weeks, (with guards doubled,) namely, from 10th September to 25th October, the mortality (nineteen) was equal to that of the five preceding months. In Notabile, adjoining Rabbato, a town of mansions occupied by the clergy and gentlemen, at present containing a population of 500 to 600 inhabitants, probably much augmented in 1813 by persons who took refuge there, no case is recorded except one in the prison.*

* Dr. Pietro Parisi, in his account of the Plague of Malta published at Palermo, 1603, states "it commenced in the beginning of June, 1592, and terminated at the end of September, 1593, in which period it made three severe visitations. In the first it was moderate, and lasted from June to September, 1592, killing 300 persons; in the second it was more severe, destroying 500, and lasted from the 12th of November till January 1593; in the last it was still more destructive, carrying off about 3,000 persons, and, as said before, disappeared at the end of September."(p. 6.)

Local Causes.—Valetta, as a whole, is a clean well ventilated town, and there are few localities in it, except the Mandraggio, that from outward appearances would be pointed out as the probable habitat of disease. On a closer examination, however, it will be found to be a mixture of palaces and hovels—Belgravia and St. Giles,—not only close to each other, but frequently in the same tenements. In the best streets, and forming parts of the best houses, there are cellars, small shops, and mezzonini or entresols, consisting often of a single room, containing a large family. The ground floor is, in many cases, over the water-tank, to which access is had by a small shaft; add to this a privy—and, in the absence of all ventilation, light, or outlet, except by the door, the accumulation of stagnant animal effluvia in these hovels is evident. To the stranger they are intolerable, and even the inmates desert them to sleep on the pavement in the summer months. These are the dwellings of the lower class of artizans—in which they carry on their trade, and lodge their families. I have frequently entered them, and found them very similar in size, darkness, filth, and wretchedness. They are often vaulted, and, in some, a floor of wood is placed about the spring of the arch, thus affording a dormitory, in which a numerous family pass the night. It was in such a hovel that Borg's family resided, having directly in front of it a church from sixty to seventy feet high.

These dark and ill-ventilated abodes furnish a large proportion of the glandular affections met with in the hospitals of Valetta.*

What are called mezzonini are inhabited by a better class, and have the advantage of a staircase and window, but these are small, and seldom placed in such a position as to afford a free current of air. In height they range from eight to ten feet, are small, dark, noisome, and have little advantage over the rooms underneath, except in being off the ground. The free passage of air through wide streets, placed at right angles, and the occupants' habit of sitting, or sleeping, during the hot months at their doors, can alone account for their comparative immunity from disease in ordinary seasons. But the pale cadaverous hue to be seen in many of them, especially the women, leaves little doubt of the injurious effects of these abodes.

The apartments of the proprietor, the entrance to which forms the middle door of the house, present a very striking contrast to those above described, for which he receives a large rent, the limited space of a fortified town leaving no choice. This portion of the building has generally a court, into which windows open, in addition to those towards the street, affording light and ventilation to every room. With filth and wretchedness on

* See note B at the end of this Report.

PLAN OF THE CITY OF VALLETTA.

The houses are marked in Black the Mezzaninos in Red & the ground Floors and Cellars in Blue Ink — The figures indicate the number of the habitation.

The figures in the Centre of the squares shew the number of Cases in that block of houses.

The figures following the name of the Street indicate the number of Cases of Plague in that Street.

The Red line includes the highest and best part of the Town, on the outside of that the ground slopes in every direction.

The Streets coloured in Red indicate the habitations of the better classes or shops — those in green the worst and generally the poorest localities — those in both colours a mixture of good & bad.

The ✠ indicate Churches.

Sra DEL GENIO (3 CASES)
Sra S.t ANDREA
Sra MOLINO A VENTO
STRADA SCOZZESE
MANDERAGGIO (99 CASES)
STRADA SAN PATRIZIO (8 CASES)
STRADA MANSAMUSCITTO (31 CASES)
STRADA PONTIENIE (8 CASES)
STRADA ZECCA (6 CASES)
STRADA FORNI (6 CASES)
STRADA STRETTA (25 CASES)
STRADA REALE (51 CASES)
STRADA SAN ZACCARIA
STRADA MERCANTI (15 CASES)
STRADA SAN PAOLO (60 CASES)
STRADA SANT' URSULA (86 CASES)
STRADA LEVANTE
STRADA SANTA BARBARA (17 CASES)
STRADA FONTANA (35 CASES)
STRADA SAN GIUSEPPE (55 CASES)
STRADA SALUTE (55 CASES)
STRADA POZZI (32 CASES)
S.r IRLANDESI (6 CASES)
PORTA REALE
PIAZZA VITTORIA
PIAZZA REGINA
PIAZZA S.t GIOVANNI
STRADA TESORARIA
Admiral's House
Commissary General's Office
Cavalier St. John
Ordnance Office
Thorn's Hotel in 1813.
Barrack Office in 1813.
Barrack of de Rolls Regt in 1813.
Bishops Palace
Main Guard
Piazza San Giorgio
Treasury
Piazza Tesoreria
Governor's Palace
St. John's Church
Library
Courts of Justice in 1813.
Monte di Pietà
Market
Commercial Rooms
A DEAD WALL 30 FEET IN HEIGHT
Nº227 THE HOUSE OF "BORG" WHERE THE FIRST RECOGNISED CASES OCCURRED
Monastery of St. Ursula
Prison in 1813
Military Hospital
Female Hospital
Civil Hospital
Cavalier St. Thomas

Department of Govt Works
Valletta, Jany 1854.

W. Lamb Arrowsmith, C. E.
Supt of Govt Works

100 50 0 500 1000 1200 feet

w & Son, Lithrs to the Queen.

either side of the entrance, a stranger would little expect to find so much space and elegance in the apartments of the higher classes in Valetta. Ascending by a spacious staircase to the third floor he enters rooms, large, lofty, and pure—the courts acting as ventilating shafts, in the benefit of which the poor underneath rarely participate.

Without these courts the houses, even of the better classes, would become intolerable in summer; for most of them being built back to back, nothing like ventilation could otherwise be had. In this predicament are the lower orders placed; having no counter-opening to the door, to relieve the stagnating atmosphere. The lower parts of the town at night, especially in sirocco winds, are very offensive, there being very few public privies or other depositories for nuisances of any kind. No town, probably, as regards the poor, is maintained in outward cleanliness at a greater sacrifice of internal comfort and purity.

It is difficult to imagine any town offering greater natural facilities for drainage than Valetta, sloping as it does in nearly every direction towards the sea. The construction of the drains I believe, is good, but the want of means for flushing in the dry months, from April to October, and the porous nature of the rock through which they are cut, must add to the unhealthiness. On entering several of the best shops in the hot months, I have been forced to make a rapid exit. Indeed, on entering many of the best houses, the smell of imperfect sewerage is immediately perceived. On the ground floors we may imagine that these things are much worse with the poor.

I will attempt to describe some of the localities most affected by plague. First on the list is the "Mandraggio"* which has been frequently alluded to by travellers as containing within a small space, a poor and wretched community. Lying in a hollow on the western side of the town, it receives little of the general traffic or thoroughfare; but is approached (except at one point) by small archways, leading under lofty houses, which nearly surround it on all sides, and so effectually inclose it, that one may perambulate Valetta for years without discovering the existence of such a place. Its lowest portion, next the quarantine harbour, terminates in a *cul de sac*, where is placed the opening of a large sewer, which receives the surface water of a great part of this quarter. Curiosity only can induce any respectable person to penetrate its mazy and narrow alleys, which run between lofty houses, where neither sun

* "Mandracchio, the inner port of a harbour," which it was originally. The block of houses, within which is the Mandraggio proper, covers about two and a half acres, and contains about 3,000 inhabitants, 1,600 of whom occupy the ground-floors and mezzonini of the interior.

nor air can penetrate. Here many of the poorest among the population reside ; and squalor, filth, and wretchedness meet one at every step. Damp, dark, and cheerless, with an atmosphere at all times noxious and stagnant, here is every thing promotive of disease, and we can only attribute exemption at any time from mortal sickness, to that power of habit which enables the human constitution to resist such deleterious influences.

Similar to the "Mandraggio" in the lowness of its situation and the poverty of its population, is Strada Pozzi, which lies at the north-east angle of the city, and is considerably below the fortifications. One portion contains several ground-floor dwellings, running parallel within a few feet of each other, leaving a very narrow lane, shut in by lofty buildings on either side. Another consists of a row of hovels within a few feet of the wall of the prison, which completely obstructs ventilation. Here, as in the Mandraggio, the passage of superficial drains and under-ground moisture keep the air muggy and unwholesome, offering a striking contrast to the sunny, dry, and well-ventilated ramparts in the vicinity. Intersecting Strada Pozzi, is Strada San Nichola, also notorious for cases of plague, which, though on the ascent of the hill towards the better parts of the town, is a narrow street and suffers from want of ventilation. Here, also, are numerous ground-floors, and small mezzonini, inhabited by a poor population.

The number of habitations attacked on the higher ground being about as one to six of those on the lower, leaves no question as to the influence of elevation, the ratio of cases increasing in every direction as we descend.

Strada San Antonio, which fronts the harbour, presented a striking contrast with Strada Saluto, immediately behind it; for we find every habitation exempt till we arrive at No. 28, where the ventilation becomes obstructed by houses between it and the harbour.

Strada Saluto, a very narrow and filthy street, inhabited by the poorer class, furnished no less than fifty-five cases from the dwellings on both sides. On arriving at No. 31, however, and from this to No. 46, which space enjoys a similar open exposure with the lower parts of Strada San Antonio, there was not one case, although several of the habitations are more miserable than those where the ventilation is obstructed.

The habitations attacked in "Strada Irelandese," were ground-floors, ten or twelve feet below the level of the roadway, and having a dead wall within four or five feet of their doors. The upper floors of these tenements, inhabited by the same class, but rising above the wall, and therefore open to the harbour, seem to have been entirely exempt.

Two dwellings in "Strada Sperone," about ten yards from Fort St. Elmo, which rises forty or fifty feet above them, furnish the next cases. Close to this, but sunk from thirty to forty feet deeper, are Strada Fontana and St. Guiseppe; they are narrow, dark, and damp. The upper floors of the former rise above the sea ramparts, and enjoyed a remarkable exemption, compared with those underneath, and in Strada St. Guiseppe behind, which had cases on every floor.

Proceeding round the city, we find that wherever similar local conditions obtained, the cases were numerous. In the highest portion of the town, overlooking Floriana, we find only one tenement infected, though nearly all are occupied by a poor population; whilst Strada Torre and a very narrow lane leading off from Strada Regina in the immediate vicinity, had no less than sixteen dwellings infected.

The influence of habitation may be illustrated by a comparison of the streets "Mezzodi" and "San Nichola;" whilst the former, inhabited by the rich, shows not a single case, the latter, inhabited by the poor, yields no less than 117.

Again, in Strada Forni, one of the best streets in Valetta, the only cases were four in the few habitations, at its lowest part, which are occupied by the poor.

Finally, there was nearly a continuous exemption of about one-third of the town; and that not only the highest, but in every other respect, in striking contrast with the portion chiefly affected.

I have described these localities as I found them in 1851; in a very different condition as to cleanliness from the same places in 1813, when pigs, goats, rabbits, and poultry were to be found not only in the thoroughfares of the town, but the habitations of the poor. These abuses have been now nearly rooted out by a vigilant police, and to this, and to sanitary improvements of every kind, a sunny and dry climate, the regular and temperate habits of the people, their festivals, bathing, and other amusements which attract them from their hovels, Malta probably owes its long exemption from Plague.

I have to regret a want of military medical records to show the diseases among the troops in 1813; like many public documents of the time, they were probably suspected and destroyed.

I am informed, however, by Dr. Bardon, who was for several months in attendance at the Pest Hospital in Fort Manoel, that there were numerous febrile attacks among the richer class; that the disease, with great numbers who were sent into quarantine, did not present any symptom beyond that of common fever, and

appeared, from the numerous recoveries, to owe the arrest of its course to the change into better air.*

To prove the benefit of segregation in a disease extending by contact, and not by infection, Dr. Hennen adduces numerous cases which occurred immediately under the windows of a military hospital—now the residence of the English bishop—and in the cellars under the St. Augustine convent, without any of the inhabitants above being attacked. But in addition to there being no direct communication in either case, both present nearly as great a contrast, in a sanitary view, between the lower and upper portions as there is between the cellars and superstructure of Somerset House. The cellars under the bishop's house have a high wall within eight or ten feet of their doors, with no other means of light and ventilation—those under the convent are dark and damp, also without opening, except the doors, while the apartments above are spacious, dry, and well ventilated.† "We have seen, says the same author (page 528) "how rapidly the disease "spread among all (?) classes, but it was in low, damp, ill-ventilated "places, such as the Mandraggio, that it assumed its most violent "and destructive form. The cellars and mezzonini seemed to be its "favourite places of residence; and as an old resident practitioner "remarked to me, in the course of professional conversation on the "subject, it was a disease that seldom went upstairs." Yet this remarkable and important fact could not suggest a doubt as to its propagation by contact.

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* Number of Patients attacked with Plague, treated by me in the Lazaretto Hospital, Fort Manoel, Valetta, in each month from June 1813 to February 1814 inclusive.

MONTHS.	Attacks.	Recoveries.	Deaths.
June - - -	292	78	214
July - - -	108	65	43
August - - -	273	207	66
September - -	49	29	20
October - -	137	120	17
November - -	112	99	13
December - -	28	24	4
January - - -	24	17	7
February - -	15	12	3
Total -	1,038	651	387

(Signed) Salvatore Bardon,
Malta, 17th Sept. 1851. *Med. Chirg.*

† The two monks in this convent, mentioned by Dr. Hennen as having died, are returned in the bulletins as "Fratelli," who perform menial work, and go to market;

At 69 Strada Mercanti, there is a very large corner house, inhabited, in 1813, by numerous poor families, amounting to about 100 individuals; fearing that if the plague entered here it would prove destructive to all, it was placed in strict quarantine and not a case occurred. What are the sanitary conditions of this tenement compared to those that were infested by the plague?—It is placed on high ground, has excellent drainage, and a large cortile or ventilating shaft which secures ventilation, light, and exemption from damp, whilst, though the inmates are crowded, none live on the ground floor; in fact, its construction differs little from the best houses.

The town of Floriana, situated about a quarter of a mile from Valetta, contains, if possible, a more dense and poorer population. The streets are narrower, and in several instances terminate in *culs de sac*, producing great stagnation of air. Good houses are here mixed up with ground floors and mezzonini. Until lately the sewerage was notoriously defective, and has been considered the cause of occasional bad fevers among the military and strangers residing there.

We have seen that the lowest and poorest localities of Valetta were among the first attacked; and here the usual concomitants, crowding and want of ventilation, existed to the greatest extent.

It appears by the following table that the villages which suffered first, longest, and to the greatest extent, were generally those on the lowest levels,* and the most densely populated, several of the highest and least populous places being entirely exempt;—thus taking the first twelve, the aggregate population of which amounts to 20,845, we find that two showed the disease as late as September and October, and that the number of deaths was only eighty-one, or 0·34 per cent.; while in the succeeding eleven villages, having a population of 31,363, the number of deaths was 1,721, or 5·48 per cent.; showing not only a remarkable exemption in the highest and least crowded, but at

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indeed, one of them is termed a servant, and that he had contracted the disease by purchasing "some old clothes in the Mandraggio." I have ascertained from Sacerdote Chappel that this was the case—that both were servants, and the first attacked (7th August) confessed to having gone out at night by the vaults of the church. The attack of the second, therefore (on the 10th), was probably contracted in the same place, and not from attending his comrade, as alleged by Dr. Hennen.

According to the Baron de Piro, a priest of this convent died, as early as the 25th April, under most suspicious symptoms, supposed to have been contracted at Sliema; yet there was no extension of the disease in the convent. His grave is one of those barred, and bears the above date.

* Zebbug and Rabbato appear to have been exceptions in point of elevation.

the same time suggesting every doubt of the alleged power of a few cases, under such advantages, to multiply the disease, as the restrictions were trifling.*

TABLE, showing the Casals or Villages of Malta, placed in the order of their relative Elevation, commencing with the highest above the Sea Level, with their respective Populations, Deaths by Plague, and the months in which these occurred.

CASALS OR VILLAGES.	Probable Amount of Population in 1813.	Deaths from Plague.	Proportion of Deaths per cent of Population.	Month in which it		Total Number of Months in each.	Aggregate per Centage. of deaths to Population.
				Appeared.	Ceased.		
Notabile and Rabato	4,542	44	0·96	May	Nov.	7	0·34
Gargur	1,139	None.	..	..	..	..	
Naxiaro	2,965	8	0·27	June	July	2	
Dingli	624	1	0·16	October	October	1	
Zurrico	3,618	6	0·16	June	July	2	
Micabiba	814	7	0·86	May	July	3	
Crendi	1,052	None.	..	..	..	..	
Siggieni	3,373	9	0·26	Sept.	October	2	
Safi	227	None.	..	..	..	..	
Chircop	315	None.	..	..	..	..	
Gudia	1,040	6	0·57	May	August	4	
Asciak	1,136	None.	..	..	..	..	
Total	20,845	81	..	..	..	..	..
Zebbug	4,776	691	14·46	May	October	6	5·48
Luca	1,268	42	3·31	May	August	4	
Zeitun	5,440	11	0·20	May	August	4	
Tarxien	1,011	1	0·09	May	July	3	
Zabbar	3,537	44	1·24	May	August	4	
Musta	3,369	32	0·95	June	Sept.	4	
Attard	997	2	0·22	May	July	3	
Lia	1,039	4	0·38	June	July	2	
Balzan	633	None.	..	..	..	..	
Birchicara	5,253	280	5·33	May	Nov.	7	
Curmi	4,130	614	14·86	May	Nov.	7	
Total	31,363	1,721	..	..	..	..	..
TOWNS.							
Valetta, Floriana	25,546	1,223 + 897 = 2,120	8·29	April	October	7	4·90
				May	October	6	
Senglea	..	One.	..	..	..	..	
Cospicua, Vittoriosa	18,649	12 + 33 = 45	0·24	May	July	3	
				May	August	4	
Total	44,195	2,165	..	..	..	..	..
Grand Total	96,403	3,697	..	..	..	..	..

N.B.—The deaths in Fort Manoel and Lazaretto, and in some small places, are here omitted.

* Dr. Hennen erred in stating that the village of Crendi "is on low ground:" for it not only stands higher than Zebbug, with which he contrasts it, but possesses that greater dispersion of the houses and other facilities for ventilation that seem to have been the source of exemption in other places.

Casal Curmi, so remarkable for the persistence of plague, is situated at the extremity of an extensive marshy flat, recovered from the grand harbour, and has always been notorious for severe autumnal fevers. It contains a very poor, filthy, and crowded population, many of whom keep pigs, which are frequently in the enclosure or even in the adjoining room with the family. The streets are narrow and tortuous, and so little intersected that strong winds would make little impression on any noxious atmosphere wafted hither from the adjoining low grounds, or arising in the noisome hovels of the inhabitants. Nearly surrounded by rising ground, except on the side of the marsh, which looks to the north, this village can derive little benefit from the S.E. winds, which usually prevail in the month of September ; and to this, and the seclusion to which its inhabitants were subjected, rather than to the alleged thefts of infected articles, we may reasonably ascribe the persistence of plague in 1813. If a low sanitary condition of a population has any share in the maintenance and aggravation of epidemic disease, it is difficult to imagine any place more favourable than Casal Curmi.

The other villages are placed on higher ground, but differ little from "Casal Curmi" in the arrangement of their narrow streets ; or in the construction of the houses, which are dark, small, seldom having more than one room, and that on the ground. It will be readily conceived why the larger of these villages, containing from 2,000 to 5,000 poor inhabitants, should have been among the first to be visited by the plague—for no houses could be more closely thrown together—more unlike rural habitations, or occupied by people more deficient in domestic cleanliness. It would appear that they did not escape in former visitations ; for in that of 1592-3, described by Parisi, every part of the island seems to have suffered. The exemption of six places in 1813 implies probably improved condition rather than accident.

Dr. Luigi Gravagna, Dr. Hennen, and Sir Thomas Maitland state, as conclusive evidence of the spread of the disease by contact, that the inhabitants of Senglea remained exempt, having cut off all communication with other towns, while plague raged in Vittoriosa, only divided from it by about a fifth part of a mile of water,—and in Cospicua, only separated by a bastion.

Senglea is built on a narrow peninsula, not unlike that of Valetta ; its principal street running along the ridge is equal in length and width to any in Valetta, and the greater part of the town stands considerably higher than Cospicua, and its ventilation is less obstructed by the fortifications than either that or Vittoriosa. Most of the narrower streets and lanes which branch off at right angles, are open to the harbour at both ends, affording excellent ventilation. On passing the bastion above mentioned,

the ground on which Cospicua is built falls abruptly about forty or fifty feet below Senglea, and a considerable part is not much above the level of the creek. Here is a large and densely crowded population closely hemmed in by high ramparts on one side and rising ground on the other, with narrow circuitous streets and alleys, the whole forming a great contrast to the town of Senglea. The town of Vittoriosa, though standing higher than Cospicua, is also much shut in by the dockyard buildings, Fort St. Angelo, and ramparts, and has few open spaces, or wide streets, admitting ventilation, being remarkable for narrow circuitous lanes, crowded by a low and miserable population. If a few places in Senglea be questionable in a sanitary view, taken as a whole no one would hesitate in pronouncing it to be in every respect superior to the neighbouring towns. But it is only the comparative exemption of Senglea that requires explanation; for in the bulletin of the 12th of June, there appears the following, under the head "fallen "sick:"—"Senglea, No. 45, Strada Crocefisso, Maria Cassar;" and in that of the 14th, her death, at Fort Manoel, is announced.

Both Cospicua and Vittoriosa had very few deaths (45) compared with the numbers of their population (probably about 12,000) as if they had participated in some advantage similar to that so nearly exempting Senglea. Every locality, indeed, on this side of the harbour seems to have suffered far less than Valetta; and the military in this district, as far as the bulletins show, were entirely exempt, though occupying eight different barracks, two of them the worst in the Command, viz, Isola in Senglea, and San Francesco in Cospicua, the latter close to the streets that were chiefly affected.

I cannot find in the "Giornale" or other documents of the period, that Senglea was under different circumstances to Cospicua or Vittoriosa. In the proclamations relating to the prohibition of intercourse, it is always coupled with these cities, and even as late as the 13th of July, where it states that "communication be suspended with regard to the towns of "Vittoriosa, Senglea, Cospicua, and Calcara of Vittoriosa, as well "*between each other respectively, as with all other parts of the* "*island*;" and Dr. Tully (p. 67) states that "the inhabitants of the "*three* cities * * * had recourse to the bold step of cutting "off all communication with the capital."

That communication was kept up with Senglea to the 12th of June, will appear from the following extract from the proclamation of that date: "1st. That no permission be held sufficient to "authorize any one to pass over to Vittoriosa, *Senglea*, or "Cospicua, or into the district of Calcara behind Vittoriosa, unless "such as *may be issued by Government*, and to which the seal of "the Government shall be affixed. 2d. That even such persons

"as may *obtain regular permits, as also the respective boats*, shall "be prohibited from disembarking or approaching the shore, except "at the places appointed by Government, where the civil guards "are posted under tents, viz., at Vittoriosa, on the Marina Grande; "*at Senglea, near the Serena*; at Cospicua, near the Convent of "St. Teresa, and at Calcara, wherever the guard may be "stationed."

The above is the first notice I can find as to prohibition of intercourse with any of the *three* cities, which up to this date appear to have been similarly circumstanced as to quarantine, and it would be safe to say that from 200 to 300 deaths had occurred previously in Valetta and other places. Nor does it appear by information which I have obtained from the Rev. Luigi Pisani, M.D., who was appointed physician to the Pest Hospital at Bighi for the *three* cities, that any difference existed subsequently: they were all in quarantine against Valetta and each other from the 13th July, and not before. Though the conviction of every one that the plague could only travel by intercourse, would very naturally suggest the inference that the exemption of Senglea could only be due to more complete restrictions; if the town was protected by no peculiar quarantine up to the height of the epidemic, or as far as can be discovered at any time, its exemption may be referred to other causes.

Among the advantages enjoyed by Senglea may be noticed less overcrowding, house-rent being cheaper, so as to enable greater numbers to live in better houses; a more free exposure to the sea; but above all, much less severe internal restrictions on the population; a relief which was also enjoyed by Cospicua and Vittoriosa. In Senglea the houses are superior, and are inhabited by more respectable people, and it has none of the small arched recesses in the fortifications to be found in Cospicua and Vittoriosa, inhabited by miserable squatters, 33 of whom appear in the bulletins.*

The exemption of the monasteries is also offered in support of segregation. The two institutions of this kind in Valetta, the

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* In the plague of 1676, which appears to have been subjected to more severe restrictions than that of 1813, all communication was cut off, from the end of April, with Senglea, Cospicua, and Vittoriosa; and although this continued for forty days beyond the 9th of August, when the disease declined, yet the deaths in these cities amounted to 2,000, 1,500, and 1,800 respectively. The introduction of the plague in this year was attributed to English vessels from Tripoli. The first recognized case was in a girl, the daughter of a dealer in general merchandize; but, as in 1813, it seems to have excited no suspicion till after the occurrence of other cases. On this occasion, also, there appears to have been considerable and long-continued difference of opinion among the physicians as to the nature of the disease, which would seem to show that cases at least simulating plague were not unfamiliar to some of those dissenting. —*Hist. dell. Sac. Religione.*

Santa Catherina and San Ursula, are very large and lofty buildings, and are both provided with a large quadrangular court in the interior, large enough, in the former, for a garden. Looking to the size of those buildings, and the number of members, who do not (in 1852) exceed in both 43, there must be accommodation of the most spacious kind. The Santa Catherina is placed in one of the most eligible parts of Strada Reale, and in addition to rising above the adjoining houses, one side extends for a considerable way down Strada St. Christophoro. The St. Ursula is also a very spacious and lofty structure. Its front and part of one side in Strada Vescovo overlook and are open to the widest part of the grand harbour and expanse of sea. The inmates of the monastery only occupy the upper floors, leaving in Strada Levante several mezzonini and ground floors underneath, the inhabitants of which, though in pratique, were equally exempt—an immunity probably derived from the free exposure to the harbour; for in Strada San Ursula behind, where the entrance to the monastery is placed, there were numerous cases of plague.

These circumstances are so much in accordance with what will be found to obtain, wherever there was free ventilation, or the reverse, that I consider it almost superfluous to describe the monasteries of Santa Margarita, in Cospicua and San Scholastica in Vittoriosa. The first is nearly isolated, built on a similar plan to those in Valetta, and, standing on one of the highest points, has free exposure to the harbour. The San Scholastica has three of its sides closed in by houses in one of the most crowded parts of Vittoriosa, but is otherwise unquestionable in a sanitary view, having a very spacious court in the interior, and, on the side chiefly inhabited, a free and extensive exposure to Bighi Bay. The San Benedetto, at Notabile, containing twenty-nine members, is also isolated and spacious. It stands on one of the highest and healthiest spots in the island, and is separated by fortifications from the village of Rabbato, almost the only place affected in this locality. Here the per centage of deaths, including Rabbato and Dingli, was only 0·96, while in Zebbug, Birchircara, and Curmi, each having about the same population, it amounted to 14·46, 5·33, and 14·86 respectively. Nor was Notabile less fortunate in previous visitations. In 1593, when nearly 3,000 persons died, it had only seven deaths (Parisi, p. 56), and in 1676, when upwards of 8,000 perished, it remained intact (Hist. della Sac. Relig. p. 448).

Locality, however, is not needed to explain the exemption of the monasteries. They possess within themselves abundant sources for the maintenance of health; their large interior courts insuring light, dryness, and ventilation to the whole building. Dr. Hennen computed that there were only about 6,000

attacks in the towns; segregation is therefore unnecessary to explain the exemption of 100 retired ladies, distributed in five spacious and unexceptionable mansions.

There are fifteen convents in the island, which contain (in 1852) 230 members, more than double the inmates of the monasteries. Considering the probable exposure of the former in the infected localities, at the outset of the epidemic, they were nearly as exempt as the latter. As far as the bulletins assist me, out of 20 deaths among 1,007 clergymen, 3 of the Capuchins* at Floriana, and 2 in St. Augustine's, in Valetta, died in convents. Of the remainder, 2 died in the Pest Hospital, 1 in the college formerly of the Jesuits, and 2 in villages, while 10 died in houses situated in the most infected localities of Valetta. The convents are remarkable for good and elevated sites, and, from their size and construction, were free from those conditions which favoured the disease.

The alleged escape of 900 prisoners in the Grand Prison, by means of quarantine, deserves some notice. Had not the bulk of the population, and six entire villages also, escaped, this would be one of the strongest cases brought forward in favour of segregation — not from the circumstance of the disease prevailing in the immediate neighbourhood, for there are numerous and more remarkable examples of exemption under similar circumstances; but that 900 persons thrown together, under the conditions in which prisoners are usually placed, should have remained free. This is the only point requiring explanation.

The prison in question is a lofty quadrangular building, standing on the brow of a hill fronting the grand harbour. It is isolated, being bounded by Strada St. Ursula in front, the ramparts behind, Strade St. Christophoro and Pozzi on either side. It consists of three stories, and occupies a nearly equilateral space about 400 paces in circumference. The interior is now seen to disadvantage: it is neglected, and in many parts dilapidated, the prisoners being accommodated in the new prison, but Dr. Hennen speaks of it as being "conducted on excellent principles; the rooms and airing ground are of ample size; the different grades of crime and the different sexes are duly separated; several useful manufactures are carried on within the prison walls, and the food is wholesome and abundant (pp. 470, 471)." The large quadrangular court, into which very large windows open from the two upper

* The numbers in the Capuchin convents at Floriana are greater (39) than any other; and it is probable that, having to beg their daily supplies of food, they were more exposed than the wealthy orders. The Baron de Piro (p. 47) notices another cause, namely, that those monks visited the sick in the Barrache at Floriana.

floors and smaller ones from the basement, is disposed into separate grounds for exercise, and is exceedingly dry and airy. There is thorough ventilation in all the rooms above the basement; large windows open on both sides, and except in two or three of the cells, windows are placed in all the sleeping-rooms on the ground floor, opening on a spacious colonnade, the only objection being that they are on the same side as the doors.

This prison was common to the whole island, and, except a portion of the upper floor, appropriated to the sick of the Navy; it was then occupied by French prisioners, and the ordinary criminals. Taking the average number of the latter for the last 20 years, viz., 174, the probable number of French would be about as six to one; and as prisoners of war, guilty of no crime, we may assume they had not only better accommodation, but were more indulgently treated than the criminals. The latter inured to the climate, though occupying the worst part of the prison, were infininitely better circumstanced than the inmates of the hovels outside, to which, it is probable, the bulk of them had been accustomed from infancy. Under cleanliness, good diet, fresh air, and social intercourse, for the construction of the building shows that the solitary system did not obtain, there was much more in their favour than those who were prohibited leaving their houses, except between the hours of 6 and 10 in the morning, and eventually not at all.

The only question is what number slept in the same room; but many of them having been withdrawn about the 12th of May, to be employed as beccamorti, scavengers, &c., there could have been no injurious crowding with the number left. In site, drainage, and ventilation, and probably in the number of cubic feet to each individual, the prison could not be inferior to several of the barracks occupied by large bodies of soldiers, exempt from the disease.

The alleged immunity of the prisoners however, can only apply to the French; for in the bulletin of 22nd May, we find under the head "fallen sick under suspicious symptoms." Michele Zammitt, in that of 30th, Serafino Morretti and Vito Corvo, "Forzati," both of whom died on the 1st and 6th of June respectively, at Fort Manoel; on the 1st June, Giov. Maria Ciantar and Francesco Galea, "Forzati," both of whom died at Fort Manoel on the 2d and 3d respectively; on the 2d of June Francesco Farrugia, who died at Fort Manoel on the 4th; on the 9th June, "died in the Grand Prison, Giov. Checuti;" on the 10th June, Giuseppe Casha; on the 22nd, "died in the Grand "Prison, Antonio Busitill, guardian;" and on the 8th July, Ann a Casar, who died in the Pest Hospital on the 11th; all attacked "*in the Grand Prison.*"

The circumstance most dwelt on in the history of the prison is, that all the criminals liberated to act as Beccamorti, fell victims to the disease. The majority of them were employed in Valetta and Floriana, and a portion at Fort Manoel and the Lazaretto. Most of them had been condemned for long periods for flagrant crimes, and are represented as men of the most profligate and reckless character. The Baron de Piro (p. 50) says. "In the midst of so many calamities, which all testified "the divine wrath, and with which every one was menaced, even "crime was not arrested, but prevailed most in those places "where the scourge fell heaviest. There in a mingled confusion "of sex, age, and condition, the lascivious dared to satisfy his "criminal desires, and the avaricious to possess himself of the "goods of another, whilst both frequently fell victims to their "delinquencies. To such evils were added the cruelties com-"mitted by those unfortunate wretches, at once too useful and "vicious; I speak of the prisoners above alluded to. Besides the "fear they inspired as malefactors loaded with crime, whose "touch was pestilential, their red and black coloured clothes "which covered them from head to foot—their reckless look—"their rough and bronzed countenances, which appeared from "under their hoods, carelessly placed upon their heads—all "presented something awfully sad and horrible, appearing to "the timid as malignant genii destined to preside over human "destruction. The houses to which they were unfortunately "called, and where the afflicted inmates looked to others for "succour, became to them places for assault and conquest. There "they committed plunder, forced the sick and the well to disclose "the repositories of their money, ill-used the dying, whom on some "occasions they threw into the same cart with the dead, and with "polluted hands dared to violate desolate women. Notwithstand-"ing, it was impossible in those fearful times to put a stop to all "their wickedness, for no guard could venture, without personal "risk, to watch them where they intrepidly penetrated. They had "arrived at such a degree of audacity, that recourse to arms was "frequently necessary to drive them out of the places where they "hoped for plunder, or to oblige them to work. Those houses, "therefore, that remained empty, and from which they had to "remove furniture or any other susceptible article, were visited "by them with the greatest delight; and, with the avidity of "enemies plundering the vanquished, ran into every corner, "searching in garrets, in cellars, and groping in every little hole "for money, jewellery, or any other article of value they could "conceal under their garments. But alas! Fools, to what "advantage? They were swept away, one after the other, and "all that was amassed was enjoyed by none of them."

It will hence appear that no part of the population was at once more susceptible of or more exposed to the climatic and accessory causes of fever than those prisoners; brought from the monotony and repose of a prison into scenes affording scope to every vicious indulgence; exposed to the sun with the most disgusting and fatiguing work in the infected localities; sleeping in miserable huts, with diet, and conduct almost at their discretion—they were like strangers suddenly transported from order, quietude, and regularity, into the midst of confusion, excitement, and pestilence. I can find no particulars as to where or under what form of disease those men died, nor even of their numbers; but we may imagine that, dreaded and shunned by every one, their complaints had no early or proper attention, conducing to recovery.

A somewhat different fate under more restraint, but not less exposure to contagion, awaited 12 men employed in Fort Manoel. According to Gabriele Cauchi, who was there for 50 days as senior guardian, of 12 beccamorti only five died. This man further states, that of 17 guardians who were there with him, though they had no direct communication with the sick, he was the only survivor:* also that he touched plague patients almost every day, and, under the direction of the doctor, opened the corpse of a pregnant woman for the purpose of christening the infant, with entire impunity. Instances of the disease without exposure to contact with the sick, and resistance to it under the greatest, are so numerous as not to be reconcilable with the views described as universally entertained in Malta. †

Great numbers of French prisoners, besides those in the Grand Prison, were in Malta during the epidemic. The bulk of them were accommodated in a very large detached building, called the Verdala Palace, situated about two miles from Citta Vecchia, and one from the village of Dingli, which had only one death. The locality, in point of healthiness, is one of the most unexceptionable in the island.

In a pamphlet published in 1841, by Dr. Luigi Gravagna, Principal Physician of Quarantine, there occurs the following: "The "government offered liberty and some reward to those *French* "prisoners who would volunteer to assist in the general sani- "tary arrangements. I repaired to the prison to make the "proposal; 60 of them immediately accepted. I employed them "in the public service, some of them were soon attacked, others "successively, and almost all died of plague, so that at the end

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* After the occurrence of the first case he occupied a room by himself.

† According to Mr. Garcin, of forty Greeks employed in the Lazaretto as beccamorti, not more than ten died.

" of 20 days I had to return to the prison to repeat the offer ; " some accepted, but unfortunately in a short time they shared " the fate of the first."*

The most extended inquiries have convinced me there is some fallacy in this statement ; that some failure in memory or error in transcribing has caused the criminals to be confounded with the *French* prisoners. The latter were in no instance employed with or near the sick ; they acted as scavengers, expurgators, &c., and all with whom I have spoken, concur in stating that no death occurred amongst them. No notice is taken of these men by Hennen, Tully, or De Piro, or can I find a single French name in the bulletins. Further, an eye witness, Mr. Satariano, son of the superintendent of these men, as also Jean Chevalier, himself a prisoner in 1813, confirm, without qualification, all I have collected from other sources.

It is stated that several prisoners of war, *not French*, were employed subsequent to the criminals, but particulars regarding their number or the kind of employment are too vague and contradictory to be of use. Mr. Skinner, surgeon to the prisoners of war, states that the disease " was principally confined to the " indigenous inhabitants. Few of the Turks or Greeks resident " in Valetta were attacked, if we except those of the lower " class of Greeks, who, in common with the felons, were engaged " in the hazardous employment which the exigencies of the occasion " required. Other foreigners were equally exempt, and the " British peculiarly so." (Med. and Phys. Journal, vol. 33.)

There is a very general belief that the troops entirely escaped the plague, and it has been alluded to in such a way as almost to confirm this belief. It will appear, however, from the bulletins, that notwithstanding the rigid isolation and comparatively superior conditions under which the men were placed, the disease found its way into four, if not five, different barracks, lying at points distant from, and having, it is probable, no intercourse with each other.

In the bulletin of 28th of June, we find one serjeant and five soldiers of De Rolls' regiment " fallen sick under suspicious " symptoms," and one of the same corps dead in the barrack, formerly the " Albergo d'Italia ;" in that of the 30th, three more of this regiment appear under the head " fallen sick, &c."† Same date, a death in the Regimental Hospital of De Rolls. On

* Dr. Gravagna's pamphlet appears to have been published to prove the communication of the plague by simple contact in the open air. He has not been happy in the selection of the particular instance (the boatman Cauchi) on which he rests his conclusion.

† The only cause assigned by Sir Brook Faulkner for the disease in this barrack was " their barrier admitting a contact with persons outside. It was a barrier at which " you could shake hands with any body on the outside."—*Report of the Select Committee*, 1819, p. 51.

the 5th of July one of De Rolls "fallen sick;" 8th, another of the latter corps "fallen sick," and a death in the Military Pest Hospital; 16th, the wife of a serjeant of artillery "fallen sick," at St. James's Cavaliere; 22d, two deaths in the Military Pest Hospital; 23d, three soldiers of De Rolls "fallen sick;" 26th, one death and another "fallen sick" in the same corps.

Up to the 27th of July the bulletins almost invariably notice the exemption of the "*navy*, military (with the exception of the "reported cases in the regiment of De Rolls), and prisoners "of war." After this all notice of the kind is omitted, and obviously for the reason that the British troops were no longer free. In the bulletin of the above date, the period about which for a long succession of years the ordinary fever has attained its acme, there appears the following:—"In barracks, a soldier of "the Royal Artillery fallen sick." In the same bulletin, under the same head, "In barracks, two soldiers and a woman of the "3d Garrison Battalion," at Floriana; also two deaths in barracks, one of De Rolls, the other of the 3d Garrison Battalion.

In the bulletin of 1st August, six persons are reported as having recovered in the Military Pest Hospital, among the names of whom we meet with those of "Private Steff" and "Drummer "Bone." On the 3d, another of De Rolls is reported "fallen "sick;" on the 7th, a death in the same corps, in the Military Pest Hospital; 13th, one of the 3d Garrison Battalion "fallen "sick;" 20th, a death in the Military Pest Hospital, and two "fallen sick" of the 3d Garrison Battalion; and on the 23rd, another of this corps is reported as "fallen sick."

No more cases are noticed in the Bulletins, but Dr. Calvert states (Med. Ch. Tran., vol. 6), that the 3d Garrison Battalion "became again infected" (at the beginning of October) "after "remaining free the whole month of September." The first case (a woman) after remaining a week in barracks under the disease, died on the 22d October; a second was attacked on the 16th; a third on the 20th; two more on the 23d, in barracks, and the servant to the town adjutant, in Valetta. On the 24th the regiment was moved to Ricasoli. "*Immediately* after its "arrival there several (4) suspicious cases occurred." (Idem).

The mansion (now the Civil Arsenal) in which De Rolls regiment was accommodated, though of excellent construction, and placed in the highest part of Valetta, is not half the size of St. Elmo, and is in the midst of houses. Presuming that this regiment was equal in strength, namely, 1,000, to the others, and the consequent necessity of occupying the ground-floors and low pitched mezzonini, it is probable that crowding here countervailed

the advantage of elevation, for it is one of the very few exceptions in which elevation did not afford protection.

The barrack of the 14th regiment, (Lower St. Elmo) mentioned by Sir Brook Faulkner in his examination before the Select Committee, in 1819, as having escaped the plague, with the exception of one suspected case "though near the most unhealthy "part of the town," is, except Forts Manoel and Ricasoli, the best barrack in the command, being not only more spacious, open, and better ventilated, but the barrack-yard and adjoining batteries, close to the sea, afford more space for exercise than any other. In the cholera of 1850, while the 44th regiment, occupying Floriana (the barrack of the 3d Garrison Battalion in 1813) and two similar barracks in Cottonera, all much shut in by other buildings, had 141 attacks and 95 deaths, or 7·81 per cent. of its strength, 1,215 (including women and children); the 69th, in St. Elmo, 1,218 strong, had only 51 attacks and 17 deaths, or 1·39 per cent., though continuing throughout to occupy the same barrack, while two of those of the 44th required to be early abandoned; and it is deserving of notice that the barrack (Fort Ricasoli, *see map*), to which the head-quarters of the latter was moved, and with immediate check to the disease, is the same to which the 3d Garrison Battalion, in 1813, seems to have owed the arrest of the plague.

Most of the barracks in 1813, as at present, were casemated, and forming part of the fortifications, with very indifferent ventilation; but improvements in that respect have taken place within the last few years. The comparatively few cases of plague, therefore, among the troops is a matter for more surprise than in the prison; but is attributable in both cases to the inmates being under the very opposite conditions to those of the population chiefly attacked, namely, freedom to breathe the open air during the day, and better ventilation at night.

It is true the military were rigidly isolated, but what part of the town population was not? A reference to the restrictions (see p. 79), imposed on the inhabitants of Valetta and Floriana from the 19th of May, will show that those who were attacked, were virtually under as rigid quarantine as those who were segregated. Watched by the deputies and masters of houses, and confined to their own district, and for 20 hours out of the 24 to their hovels, there was in fact no intercourse, except among the members of the same family; and even these, we may suppose, exercised every caution, for contact of the most trifling kind seems to have been universally dreaded.

No portion of the population was more likely to avoid contact than the volunteer guards employed in the several districts, for the purpose of preventing any infraction of quarantine. From

the commencement of the epidemic to the middle of July, during which the restrictions were less rigid, and the liability to exposure, therefore, greater than it was subsequently, very few of them appear in the bulletins. From the latter period to the 4th of August, when the Urban guard, composed of householders, was organized to assist them, 41 are reported as having "fallen "sick" and died. After this, to the end of September, they suffered to a nearly equal extent. Now, by the proclamation of of 17th July no person was permitted to be out of his house, except between the hours of 6 and 10 in the morning; by that of the 2d August, "absolute retirement of all the inhabitants of "Valetta and Floriana" was enforced, "with the exception of "such persons only as may be required to go out by the special "exigencies of the Government, or who may be engaged in the "supply of provisions to the community, and in other indis-"pensable branches of the public service;" and as at this time the penalty of death was incurred by any one found entering an infected house, it is difficult to understand how the agents—the *bonâ fide* delegates of the Board of Health—empowered to carry these measures into effect, could have suffered to such an extent solely by intercourse with the diseased.

Something more conclusive of the inutility of segregation is to be found in the shipping. By the proclamation of 7th May, "Crews on board ship were to consider themselves in quarantine;" on the 22d, "All communication with the shipping was to "cease after sunset;" 15th June, "No one to leave his ship "without a written permit, and no person to be admitted on "board any ship;" and on the 8th July the restrictions were still more severe. Notwithstanding, on the 9th May, a case of plague is reported on board a vessel in St. Paul's Bay; on the 6th June, a case is reported, "fallen sick under suspicious "symptoms," on board the "Monarch" Transport; on the 13th a death from plague on board the "Corsale il Coragioso;" 23d, one "fallen sick" in the "Penelope;" 1st July, a death from plague in the "Bella Virgine;" 2d, one "fallen sick" (afterwards dies) on board the "Mabruc;" 14th, one "fallen sick" on board a "Sparonara;" 15th, a death from plague in "La "Guiditta;" and on the 16th one "fallen sick" in "La Bella."* From the 9th May to the 16th July, 9 vessels became infected; and there is a correspondence in the number and severity of cases

* Dr. Hennen, after stating his belief that the plague is never propagated, except by contact, adds in a note, "Would it not (infection) also have infected the shipping in "the great harbour during its passage across? but the shipping in the great harbour "was not affected," p. 511. Now in two of the vessels, the great harbour is specified, in the others it is simply stated "in port." It is, however, due to Dr. Hennen to state, that he "made many enquiries after a copy of the original notices (bulletins), but in "vain."—Note, p. 253.

with the progress of the disease on shore. Thus in May 1, recovered 1; in June 3, recovered 2; in July 5, recovered 2; and that there may be no question as to the cause of death in the above cases, which all appear in the bulletins, I extract the following from the bulletin of 14th May:—"N.B. Neither in the "present or in the former bulletins have any deaths been noticed, "but such as have been occasioned by direct plague, or attended "with most suspicious circumstances, as have been always parti-"cularly specified." This may be considered as a guarantee for the unequivocal character of all cases inserted in those documents; for the disposition of the authorities appears to have been rather to curtail than magnify the number of the sufferers. It is, indeed, believed that the deaths are considerably understated in the bulletins.

Although the connection of the disease with locality may not appear to be borne out in every case, the collective evidence on this point is conclusive.

I employed a competent and trustworthy Maltese (Mr. Guiseppe Scicluna) to visit every house in Valetta in which, according to the official bulletins, plague occurred, in 1813; and as the numbers of the houses are the same, the result may be considered as substantially correct. The subjoined summary will show the immense preponderance of sickness among those living in the worst houses and most questionable localities.

TABLE, drawn from the daily Official Bulletins, showing the number and description of the houses in which cases of Plague occurred in the Epidemic of 1813.

Total No. of the Streets attacked.	Total No. of Dwellings attacked by Plague.	Total No. of Cases of Plague in the Streets attacked.	Description of the Habitations attacked.				Their Ventilation.				By whom Inhabited.				Class Inhabiting the Houses.		
			Ground Floors.	Cellars.	Mezzoninos.	Houses.	Good.	Partial.	None.	Total.	Respectable.	Middle Class.	Poor.	Total.	Respectable and Middle Class.	Poor.	Total.
49	564	1,131	252	44	141	127	107	170	287	564	87	94	383	564	84	43	127

There may have been alterations in several houses since 1813, as also in the class of occupants, but these are so few as not to affect the general result, which may with safety be accepted as a close approximation; moreover, any difference would probably be in favour of the influence of local conditions; for the population of Valetta being at that time larger by several thousands, and house rent much higher, we may presume that crowding obtained more than at present. The Official Bulletins give the name and

place of residence of those attacked, so that I have had no difficulty in discovering the identical house, which in the vast majority of cases, remains the same as in 1813.

The alleged introduction of the plague into the island of Gozo in 1814, appears to rest on very questionable grounds. According to Sir Thomas Maitland, in his Despatch of 1819 to Lord Bathurst, "One of the persons who had been sent in to the Lazaretto for "forty days, on being liberated, directly proceeded to his house "which had been originally within the cordon [at Curmi,] but "which was now without, in consequence of its having been "straitened, as above mentioned. This person, before he went into "the Lazaretto, had concealed in his garden a small box; on "quitting the Lazaretto, he dug it up, carried it to town, and "then immediately proceeded with it to the island of Gozo, "where he had some relations in the village in which the plague "afterwards appeared; he then opened it and gave, what they "term a faldetta (a black silk cloak, universally worn by the "women of Malta) to his relation; I have not the smallest doubt, "the plague was by this means generated in Gozo."

Dr. Calvert, however, says: "A man, indeed, did go from this "neighbourhood (Curmi), and was the first in that island (Gozo) "who fell a sacrifice to the disorder; but as to his digging up a "box, this was an idle report, and could not be substantiated, as "I was confidently assured from the best authority."

Supposing Sir Thomas Maitland's statement to be correct, there is no evidence that either the man or the contents of the box had come in contact with infected persons or articles. But if they had, we can scarcely credit that the poison after a lapse of several months retained sufficient activity to communicate the disease. Captain Schembri (see p. 61) states that there is no instance on the records of the Lazaretto of Malta of any depurgator being attacked with plague, and greater doubts will arise as to the retention of the poison by clothes, when it is stated that from the 13th of November to the end of December, numbers of persons were engaged in a general purification of clothes in Valetta; and houses that had been shut and sealed, and in which whole families had perished, were then purified, without the occurrence of a case of plague.

The evidence against the communication of plague by fomites seems so conclusive, that it is not probable a silk cloak which had lain buried in the earth for some months could effect in February 1814 what cartloads of justly suspected articles failed to do in November of the preceding year, before the disease was wholly eradicated in the villages of Malta. But it is open to question whether the first recognised case was one of plague, for, according to Dr. Tully (p. 74), "he died suddenly at his own

" house," and " his body was carried to the parish church, and " he was buried with the accustomed funeral ceremonies."

According to the Baron di Piro, Angelo Galea, the subject of this case, left Malta on the 19th February and died suddenly on the 22d. His daughter was attacked on the 28th, and died a few hours after her arrival at the hospital at Rabatto. Among the first cases were the priest and grave-digger (p. 77). I have ascertained that Galea was five, if not six, days in Caccia before his death on the 18th,* and that the grave-digger, " Cassimiro Rapa," died on the 2d of March; but the priest, " Vincenzo Cauchi," aged eighty-two, died on the 27th of April. The latter had no communication with Galea, who received neither religious nor medical assistance, his death having been so sudden as to call for a coroner's inquest, when buboes are said to have been discovered in the axillæ, which had been for two days dressed by his daughter Rosaria.

" Modesta Hili," a neighbour and eye-witness, questioned by Mr. Attard, states that she not only saw Rosaria preparing a poultice the day before Galea died, but a tumour in the arm-pit; and that, wishing to assist in its application, Galea " bid her stand " off, as he had a fever and she might take it." This statement, if correct, would justify the suspicion that Galea had the disease on arrival. As that, however, is not alluded to by any official or trustworthy authority, it may be presumed that the fact of his recent arrival and sudden death, and that of his daughter, were the only grounds for fixing on him as the importer of the contagion; for it is pretty certain that actual disease of a suspicious nature would have supplanted indirect means in support of the allegation. This testimony is also at variance with a statement of the same witness (Modesta) that Galea had been to Rabatto (two miles distant) on the day preceding his death, proving the absence of any serious illness during nearly the whole of his sojourn, which from all accounts was not more than six days.

Mr. Attard states that twelve days elapsed after Galea's death before any restrictions were imposed on the inhabitants, during which only two deaths occurred, namely, Galea's daughter and the grave-digger. According to the witness (Modesta) considerable alarm and question as to whether the disease of which Galea died was plague, seem to have spread, but armed people were not placed on the houses till the death of Rapa, the grave-digger, on

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* Die xviii Februarii 1814. "Angelus Filius Michaelis Galea, Ætatis suæ quadraginta septem annorum, nullisque receptis Sacramentis animam deo reddidit; cujus Corpus Sepultum in hoc Parochiale Ecclesiæ."

Ex originale libro fidelium defunctorum hujusce Santæ Parochialis Ecclesiæ Terræ Caccia presentum extraxi copiam, et manu mea firmavi ego Parochus dictæ Ecclesiæ.

Sub die xii, Octobris 1853. FRANCESCUS BUTTAGIEG.

the 2d of March. It was at this date (see Despatch of 1819) that Sir Thomas Maitland ordered the disease to be treated as plague until it should be "ascertained satisfactorily" whether it was that disease or not. It is, therefore, probable that Rapa's was the first "suspicious case" notified to the authorities of Malta. Plague was then declared; the inhabitants were strictly segregated, and on the 7th or 8th troops were sent from Malta to form a cordon. The fourth death occurred on the 6th of March, and from that to the 31st fifty-one died, several in their own houses, but the greater number in the Plague Hospital, which was opened on the 19th. On the 31st the whole of the inhabitants of four-fifths of the village were placed in tents on a neighbouring plain, and their cattle penned on the same. The remaining fifth part of the casal facing the north-west was never infected.

The removal of the inhabitants seems to have acted beneficially, for in the succeeding two months, or to the last death on the 28th of May only forty-nine died. Among these were five members of the family of Custo, brought from Rabatto along with the first attacked; a priest who died in the hospital at Caccia on the 31st of March. The others were placed as suspected in barrache near to the hospital, of whom two died on the 10th and three on the 11th of April.* Among other victims either employed or living within the village subsequent to the 31st of March were five beccamorti; a depurgator; the parish priest; Drs. McAdam and Pace, besides the members of infected families placed in barrache, and the maritime guard forming the inner cordon, of whom a considerable number died.

For the following details on the first cases I am indebted to the careful inquiries of Mr. Attard. His dates and succession of the deaths taken from the parish register, may be relied on as correct. Those of the attacks as well as the nature and amount of intercourse are more questionable. Coming, however, from two eye-witnesses, Modesta Hili and Pietro Bonello, in part confirmed by Giacomo Vella, the sexton, they are plausible if not, perhaps, as reliable an approximation to the truth as can be obtained forty years after the occurrences, among an ignorant population deeply imbued with the doctrine of contagion.

18*th February.*—1. "Angelo Galea brought the plague from Malta; lived in the house of Anna Bigoni Fiurina, in which also resided his daughter, Rosaria, wife of Gaetano Xerri. Gaetano only survived." (See 2 and 5.)

28*th February.*—2. "Rosaria, wife of Gaetano Xerri, daughter of Angelo, attacked in her house and died in the hospital of Saint Giulano, at Rabatto."

* This family were the only persons attacked in Rabatto, the Capital; they inhabited the Mandraggio, a narrow, dark, and damp locality.

2*d March.*—3. "Cassimiro Rapa, sexton of the church. He buried Angelo Galea, was attacked in the room called 'Bottega' in which he lived, and was found there dead on the 2d of March. This man had a house, a little distance from the room he occupied, in which his family resided, consisting of Grazia, his wife, Giuseppa, his daughter, wife of Michele Saltana, Rosaria and Maria, younger children of Michele Saltana, all of whom were in communication with Cassimiro up to the evening before his death. After his death they were transferred to the Barrache, together with Paolo Teuma (died 17th April. This man wore the cap of Angelo Galea, which had fallen from the corpse, for fifty days), and all remained unaffected except Paolo."

6*th March.*—4. "Michele Hili, a friend of Angelo Galea, who frequented the house as well during Angelo's illness as that of his daughter. He was attacked and died in his own house." (See case 6.)

7*th March.*—5. "Anna Bigone (in whose house resided Rosaria, wife of Gaetano Xerri, daughter of Angelo), attacked and died in her own house; about the same time was attacked Gaetano Xerri, her nephew, who recovered after long detention in the Plague Hospital." (The date of attack of the last must be inaccurate, as the Plague Hospital was only opened on the 19th.)

9*th March.*—6. "Teresa Buhagiar, sister-in-law of Michele Hili (No. 4), attacked on the same day in the house with Michele Both died there. Giuseppe, husband of Teresa; Maria, wife of Michele, and daughter of the couple, Buhagiar; with Gabriele and Paolo, sons of the same, were transferred to the Barrache and survived. They were intimate friends of Angelo, frequented his house at his death and during the sickness of Rosaria, his daughter."

11*th March.*—7. "Baldassara Attard, aged 80, attacked and died in his own house; he had had no communication with the family of Galea. His daughter, transferred to the Barrache, survived; it was doubted that the former died of plague."

13*th March.*—8. "Giuseppe Said, lived close to the house of Galea, and went to see his corpse; attacked in his own house, and having gone out in a state of delirium was shot by the Adjutant of Police." (Another was shot on the 31st March for concealing his illness.)

18*th March.*—9 and 10. "Paolo Camilleri, Angela Camilleri; attacked and died in their own house. This couple had

gone to condole with Rosaria after the death of her father Angelo. Rosa, Margarata, Angela, and Maria, their children, and a daughter of Margarita were transferred to the Barrache and survived, except Maria (died 20th March.")

18*th March.*—11. Lorenzo Cassar ; attacked and died in his own house. He was one of those who accompanied the corpse of Angelo Galea from his house to the church ; without family." (Died twenty-eight days afterwards.)

18*th March.*—12. " Angelo Curmi ; attacked and died in his own house ; a friend of Galea, and visited the house at his death and during the illness of Rosaria ; without family.' (Died twenty-eight days afterwards.)

18*th March.*—13. " Andrea Cordina ; attacked in his own house and died in the hospital. His brother Francesco transferred to the Barrache, was attacked there, and died in the hospital on the 20th of March."

19*th March.*—14. " Signore Giuseppe Formosa, deputy lieutenant of the village ; attacked in his house and died on his way to the hospital. Maria, his wife, Ignazio and Saverio, younger children, Salvo Rapa, Grazia Rapa, Giovanni Rapa, Angela Rapa and her husband, Francesco Pace and Giuliano Rapa, sons-in-law, and the father-in-law were confined in the Barrache and died in hospital, except Ignazio and Saverio, the younger children, and Francesco Pace who remained unaffected. (The deaths of the others took place as follows : Maria, the mother, Salvadore, Grazia and Angela on the 20th ; Giovanni on the 23d ; and Guiliano on the 31st of March.)"

Mr. Attard's information regarding the subsequent cases almost exclusively relates to the place of attack and date of death. No connection with the first cases is alleged, except in three instances, one of which I have given (Teuma, No. 3). The others were two sisters, Giovanna and Olimpia Pace, who, it is said, had had ingress to the house of Signore Formosa (No. 14.) They were attacked in their own house, and died in the hospital on the 20th of March.

The above details may seem to afford as strong evidence of the importation and diffusion of plague as some could desire. It is necessary, however, to remember that all these persons were neighbours, living in the same unhealthy part of the village, as Galea ; that all except Rapa (No. 3) were attacked from sixteen to twenty-seven days after Galea's death, and from six to nineteen days after the removal of his daughter, and that twenty-five members of the ten families infected, as well as the great numbers who, according to the witness Modesta,

came to welcome Galea and to see his corpse, either entirely escaped the disease or had it when communication with him could no longer be suspected as the cause. Neither do we find among those attacked at this period any of the four members of the two inquests and their subordinates, nor the persons who conveyed Rosaria to Rabatto, nor any of the attendants in the hospital where she died.*

But let us suppose that all those cases contracted the disease from the family of Galea (after the 2d of March they could not from each other) we have reason to expect, as in sporadic small pox, that after they had been isolated for sixteen days, the disease would have developed itself in those exposed at the outset, and been either arrested or on the decline. Far from it: in the next thirteen days forty-three died, of whom only six were related to or in any way connected with the preceding cases (five were of the family Formosa, No. 14). Was the disease now at an end or declining? On the contrary. From the 6th of April to the end of the epidemic, on the 28th of May, there were forty-seven more victims, and none of them had any connection with the first cases, all being strictly guarded.

From the 2d of March, then, to the 28th of May, during which time no intercourse took place, 101 died, including, probably, nearly all who remained in the infected portion of the village after the 31st of March. But the following, perhaps, will best explain the course of the disease and of the mortality:—

1.	Attacked and died in houses to 19th of March	14
2.	Attacked in houses subsequently, and died there or in the hospital	20
3.	Attacked in Barrache from 19th of March, and died in hospital	70
4.	Attacked in the tents, and died in hospital	3
5.	Total died in hospital	89
6.	Total deaths 104, of which 71 were males, and 33 females.	

This mortality took place in thirty-eight single persons and twenty-four families, the latter consisting of 108 individuals, of whom forty-one remained unaffected. Among the former were twenty-one officials; hence the large preponderance of males. Nearly all, therefore, who were forced to remain in the village, were swept off; while 1,200 or 1,300 persons

* Much less must we forget that all those cases occurred after from four to sixteen days of the most rigid seclusion in these filthy dwellings.

encamped at a short distance, many of whom, it is certain, had been in communication with Galea's family, lost only three individuals. I leave for future inquirers to determine whether a local cause, from which quarantine prevented all chance of escape, or contagion was here the most active agent. Similar occurrences under similar measures, in Malta and other places in the Mediterranean, between 1813 and 1816, seem to offer a ready solution of the question.

The outer cordon, consisting of 100 men of the Sicilian regiment, accommodated in seven tents and six houses, was entirely exempt, while the maritime guards (Maltese) within the village and guarding the hospital, suffered considerably. "The hospital" says Mr. Attard, "is within, and at the southern extremity of "of the village. It is large, and separated from other houses, but "badly adapted to the purpose. It contains a large ox-stable and "four rooms, two of which are dwelling-rooms, the others, a mill "and storeroom for straw, all on the ground, and deficient in light "and ventilation. I did all in my power, on account of these "objections, to prevent this building being occupied as an "hospital in the cholera of 1837." Nearly every case of plague, subsequent to the 19th March, was treated here.

In ninety-nine days, from the first to the last death, 104 died, yielding a proportion on the four-fifths of the population which suffered of 7·22 per cent., or, for the time, equal to the mortality in Zebbug. Some of the causes of this have not escaped the attention of Mr. Attard. He says, "The part that faces the north-west, which comprises about a fifth of the village, remained intact by the plague, and in fact was never in quarantine, while, in the first days of its appearance, it raged with all its force in one street which leads from Ghar Scejba to the small church of St. Antonio, and the precincts of the parish church. It was again observed, in the cholera of 1837, that in the three first days the identical houses affected in 1813 in Strada Ghar Scejba, and the localities just mentioned, yielded more cases than all the rest of the casal during the whole period of the epidemic."

"The houses at the north-west of the village are in parts more elevated than in Ghar Scejba. The houses in Caccia generally are scattered and detached, except in the quarter near the church, where they are more concentrated and closer to each other. The inhabitants of Ghar Scejba are placed in the centre of the village, at the mouth of a valley, where there is water running from several fountains and rivulets, to orchards and kitchen gardens, forming, by their refuse and sediment, pools of mud, and here and there little marshes, sufficient at times to corrupt any air. Indeed, the Government, at the beginning of summer, take means to remove the stagnant water."

On the 13th of June the remaining members of families that had been infected were removed for a time to Ramola Bay, guarded by a cordon, and made to bathe three times a day, under the superintendence of the police. The remainder of the population returned to the village, but the whole were admitted to pratique with the rest of the island on the 26th of July, and with Malta on the 8th of September. There is here, again, room to question whether the gain was equal to the sacrifice, or rather, that as in the first twelve days, this suspension of intercourse and occupation for six months might not have been with impunity altogether avoided. The arrest of the disease by removal from the locality while proving the subjection of plague to the means found beneficial in other epidemic maladies, points significantly to the propriety of of this removal, and to the cruelty of chaining a population in an unhealthy spot by quarantine.

Captain Schembri, who held the appointment of Captain of the Port of Quarantine in Malta for twenty years, and served for several years previously in the Venetian Navy, where he had frequent opportunities of meeting with plague, states, in a small pamphlet, entitled "Ragionamento Pratico Sanatario," published in 1842:

"1st. That many ships loaded with, and without susceptible goods, arrived from infected places and completed their voyage and quarantine without any case of plague.

"2d. That some ships coming from the same infected places have developed the plague in a single individual, and it has not extended further.

"3d. That on some occasions the first attack was followed by others, not only during the voyage, but after arrival in port.

"4th. That in other instances the disease did not appear on the voyage, but showed itself after arrival, namely the 'Acheron' and 'Mabruca Georgiana.'

"5th. Cases of the transmission of the disease to those employed in the Lazaretto are rare, and these were attacked by having had contact (?) with the infected and *their clothes. There is no instance on the records of the Depurators of susceptible cargoes being attacked.*"

That the arrival of ships at Malta having cases of plague among their crews has been of frequent occurrence without any spread of the malady in consequence, is proved by the following extract from Records in the office of the Quarantine Department, showing the various Vessels with this disease on board duly depurated in the Lazaretto since the Plague of 1813.

"1819, *Maltese Bombard 'Sta. Trinita,' from Susa.*

"On the 27th of March 1819, the Maltese Bombard 'Sta 'Trinita,' Francesco Azzopardi, master, arrived in Malta from

Susa, having on her way touched at Lampedosa, with five persons in crew (originally six) with a foul Bill of Health, in consequence of the plague prevailing at Susa, where from fifteen to eighteen persons died daily of that disease.

"The master of the Bombard on his arrival deposed on oath, 'That on the 20th of March he sailed from Susa bound to Malta, and that on the 19th of March, the day previous to his departure, the boy, Michele Casalotto, was taken ill with head-ache, debility and fever; the master gave him some physic, and two days afterwards the boy commenced vomiting without any delirium, but on the 22d of March, a few hours after their arrival at Lampedosa, he died.'

"The master further deposed that during the boy's illness, he was several times examined to ascertain if any external marks of plague appeared on him, but none were visible; after his death, however, they observed from six to eight petechiæ scattered about the belly and thighs.

"The Bombard was laden with oil and soap.

List of Persons forming the original crew of the Maltese Bombard 'Sta Trinita, with the dates of Sickness, and Death of those who were attacked by the Plague, as well as of those who recovered, or who had not contracted the contagion.

Names of the Crew.	Days on which		Remarks.
	Were Attacked	Died.	
Francesco Azzopardi, master	—	—	
Michele Casalotto, boy	—	—	Died during the voyage.
Vincenzo Majoli	3 April	8 April	Bubo on the right groin.
Guiseppe Rizzo	4 „	4 „	„ left groin.
Fortunato Zarb	4 „	Cured	„ „ „
Michele Lubrano	4 „	Cured	Tumour on the shoulder.

"The Health Guardian who was embarked on board the said Bombard on the 1st of April, and the two persons who nursed and attended the sick persons sent to the Lazaretto (all from pratique) were not attacked.

"1821. *Maltese Brig 'Costanza,' from Alexandria.*

"On the 21st of March 1821, the Maltese brig 'Costanza,' Giovanni Luppini, Master, arrived from Alexandria, with a foul Bill of Health, with fourteen persons in crew and eight passengers (but sailed originally with fifteen in crew and ten passengers), bound for Malta.

"The master of the brig on his arrival deposed on oath, 'That 'on the 28th of February he sailed from Alexandria. and that 'on the 27th, the day previous to his departure, received on 'board ten passengers, eight in good health and the other two, 'Guiseppa Sevasta and her daughter Rosolia, were of sickly

'appearance. The master observed on the day of their departure 'that they both had a diarrhœa, and suffered much from sea 'sickness; that Guiseppa Sevasta got worse, and on the 2nd of 'March died. The master together with the crew and passen-'gers examined if any external marks of plague appeared on 'her, but none were discovered. On the 16th of March, Rosolia 'Sevasta died also, and on examination no marks of plague were 'visible on her body.'

"Amongst the crew, during the voyage, Francesco Mangion suffered much from sea sickness, and rejected every nourishment he took; on the 17th of March he became feverish and delirious with abundant evacuations, and at midnight he died.

"As the corpse of Mangion was still on board, the master of the brig was ordered to land the same in the Lazaretto, and when inspected by the Quarantine physician, several petechiæ were visible.

List of the several Individuals, forming the Crew and Passengers as originally started from Alexandria.

Names of the Crew and Passengers.	Days on which		Remarks.
	Were Attacked	Died.	
1. Giovanni Luppini, master	—	—	
2. Stefano Giove	—	—	
3. Guiseppe Vella	—	—	
4. Guglielmo Spartaro	—	—	
5. Francesco Mangion	—	—	Died during the voyage.
6. Giacinto Manuch	22 March	25 March	Petechia.
7. Michele Bartolo	27 „	30 „	Bubo in the right groin.
8. Salvatore Spiteri	—	31 „	„ „
9. Guiseppe Inguanes	28 March	1 April	„ „
10. Salvatore Iberese	—	Cured	Swelling in the glands.
11. Lorenzo Attard	29 March	2 April	Carbuncle on the shoulder.
12. Guiseppe Vella (2)	30 „	1 „	„ „
13. Salvatore Frigieri	31 „	3 „	Bubo on the right groin.
14. Vincenzo Mangion	1 April	4 „	Bubo and a carbuncle on the shoulder.
15. Fortunato Borg	5 „	7 „	Petechia.
Names of the Passengers.			
1. Francesco Stabile	—	—	
2. Michele Trombetta	—	—	
3. Guiseppe Cutajar	—	—	
4. Guiseppe Camilleri	—	—	
5. Guiseppa Sevasta	—	—	Died during the voyage.
6. Rosolia Sevasta	—	—	
7. Catarina Viaggio	1 April	Cured	Tumour on her neck.
8. Maria Antonia Rosso	—	7 April	Carbuncle on the right shoulder.
9. Giovanni Viaggio	5 April	26 „	Bubo on the left arm.
*10. Ignazio Rosso	13 „	16 „	Bubo on the right groin.

* See further notice of these cases, page 73.

"The brig 'Costanza' was laden with beans.

"The crew and passengers were landed at the Lazaretto, and three persons attended on them.)

"On the 28th of March a Health Guardian and four sailors were embarked from pratique on board the said brig 'Costanza,' for depurating the ship and landing the cargo in the Lazaretto stores. One of the sailors, Pietro Briffa, on the 2d of April was attacked and cured, the said Pietro Briffa during the plague in Malta in 1813 had also been attacked. Another of the said four sailors, Vincenzo Debono, who was also attacked, had a bubo in his right thigh, and was also cured."

"1828. *Russian Frigate 'Castor,' from Armiro.*

"On the 13th of June 1828, the Russian Frigate 'Castor,' under the command of Captain Sittin, with 281 persons in crew, arrived at Malta from Armiro, from which place she sailed on the 21st of May direct for Malta.

"The captain and the physician deposed that the frigate 'Castor' left Malta in pratique on the 30th of April last, having 285 persons in crew for Navarin and Madone for the purpose of cruising there. On the 3d of May she was in company with other Russian ships of war which had captured a Turkish corvette which sailed from Madone for Alexandria on the 2d of May, having on board 600 individuals including the crew, invalids, sick, and wounded from Ibrahim Pasha's army.

"The captured corvette was manned by fifteen sailors from the 'Castor,' and by portions of the crews of other ships of war which were in company with the 'Castor,' and 200 individuals out of the 600 who were originally on board, were taken on board the 'Castor,' and on the 11th of May were all landed on the coast of Morea; the 'Castor' then received back the fifteen sailors from the captured Turkish corvette.

"The 'Castor' on the 17th of May arrived at Armiro for a supply of fresh water, and on that day a sailor was taken ill with a violent headache, vomiting and delirium. On the 18th of May another sailor was also taken ill with similar symptoms, which circumstance caused some alarm to the physician. On the 19th of May, the sailor who was taken ill on the 17th died, and the corpse having been inspected, nothing external was visible indicating plague. On the 20th, the other sailor who was taken ill on the 18th died, and after inspection no marks of plague on his body were visible. A third sailor was attacked with similar symptoms of malady on the 20th of May.

"On the 21st the 'Castor' took again her position, and on the 24th the sailor who was reported sick on the 20th of May died, without having on his body any mark indicating plague.

"On the 2d of June, whilst cruising, a fourth sailor was taken ill, and besides the general symptoms of the malady, which had been observed on the three other sailors, this one had a swelling under the right arm, and on the 9th of June he died. In consequence of which the physician made his official report to the captain, stating that he considered the malady which had prevailed on board to be a contagious pestilential disease. The commander made his report instantly to the senior officer, who commanded the 'Ezechielle,' and received orders to proceed to Malta and place himself under the sanitary regulations of that Lazaretto for the safety of the crew and for the duly depurating the frigate 'Castor' under his command.

"It is not known whether the sailors attacked had formed part of the prize crew on board the corvette or not.

"No new cases of plague occurred on board or at the Lazaretto during the Castor's quarantine."

(Four guardians were embarked.)

"1835. *Russian Brig 'Sophia Elena,' from Alexandria.*

"On the 2d of May 1835, the Russian Brig 'Sophia Elena,' Demetrio Fiorio, master, arrived from Alexandria with a foul Bill of Health, bound for Leghorn, with thirteen persons in crew, originally fifteen in number.

"The master of the 'Sophia Elena' deposed on oath 'That he 'sailed from Alexandria on the 18th of April for Leghorn; that 'whilst at Alexandria on the 11th of April, one of the four sailors 'whom he had there embarked fell overboard into the sea, and 'on the same day he was taken ill with a pain in his chest; that 'the master having administered to him some physic, and by 'applying leeches, the man felt himself better, and continued 'in a convalescent state until the day of his departure from 'Alexandria, the 18th of April, but on the following day 'he got worse, and about midnight died. On the following 'morning the corpse was examined, but no external marks of 'plague appeared, and both the corpse and clothes were thrown 'overboard.

"'On the 25th of April, whilst in the vicinity of Candia, 'another sailor was ill with pain in his chest, extreme debility, and 'spitting of blood, and continued daily getting worse until the '28th, on which day he died. On examination of the corpse 'several blue spots were observed on it.

"'On the 1st of May, being near Girgenti, a third sailor was 'taken ill with violent headache, and a general debility, and 'remained in that state until ten o'clock A.M. of the following 'day, 2d of May, and just when the 'Sophia Elena' was about 'entering the Quarantine Harbour of Malta, he expired.

"'On the 2d of May a fourth sailor was taken ill with the 'same symptoms as the others, with the addition of cold shivering, 'and that the rest enjoyed good health on board.'

"(The sick were landed at the Lazaretto, and attended by two persons, and five guardians were put on board the vessel.)

"The cargo of the brig 'Sophia Elena,' chiefly consisted in bales with cotton and linen, and other non-susceptible goods."

List of the Crew as originally started from Alexandria, with the cases of Sickness, Deaths, &c.

Names of Crew.	Days on which		Remarks.
	Were taken ill.	Died.	
Demetrio Fiorio, master .	—	—	
Angelo Vreto, mate . .	—	—	
Angostino Fiore . . .	—	—	
Teodoro Cavalla . . .	—	—	
Costantino Cumpi . .	—	—	
Giovanni Hadajena, boy .	—	—	
Michele Giusleve . . .	—	—	} Died during the Voyage.
Vittono Stellato . . .	—	—	
Domenico Pagano . . .	1 May	2 May	Carbuncle and Petechia.
Matteo Supana	2 „	5 „	Petechia.
Taftuh Maxinem . . .	17 „	27 „	Petechia and Carbuncle.
Francesco Danesi . . .	18 „	20 „	„ „
Antonio Garibaldi . . .	18 „	Cured .	General Symptoms.
Antonio Catani	20 „	23 May	Bubo and Petechia.
Michele Sulcremo, boy .	22 „	23 „	Carbuncle and Petechia.

"1837. *Ottoman Paranza 'Mishud,' from Tripoli.*

"On the 22d of February 1837, the Ottoman Paranza 'Mishud,' Klifa Brigeri, master, arrived from Tripoli with a foul Bill of Health, having six persons in crew, and fifty-two passengers, bound for Malta.

"The master of the Paranza deposed on oath, 'That he left 'Tripoli on the 15th of February, and that during the voyage, 'one of the passengers was taken ill, and was kept apart in a 'small boat on deck.

"'That the above Paranza had no kind of susceptible goods 'on board.'

"The passenger Enerico Borg, was instantly landed in the Lazaretto, when a Health Guardian from pratique was ordered to attend him with due precautions.

"Upon inquiry, it was ascertained that Enerico Borg was taken ill on the day of his departure from Tripoli, and when he was inspected in the Lazaretto by the Quarantine Physician, two bubos were clearly visible on the groin, which some days afterwards opened, and the man was cured."

(One guardian was put on board the vessel.)

"1837. *Ottoman Bombard 'Sada,' from Tripoli.*

"On the 23d of February 1837, the Ottoman Bombard 'Sada,' Mustafa Cantargi, master, arrived from Tripoli with eleven persons in crew, and twenty-one passengers (originally started from Tripoli with twenty-two passengers, Hadji) with a foul Bill of Health, bound to Malta.

"The master deposed on oath, 'That he sailed from Tripoli 'on the 10th of February, and that one of the passengers during 'the voyage fell overboard, and was drowned.

"'The sick were landed at the Lazaretto, and attended by 'two pilgrims of the party, one guardian was put on board the 'vessel.

"'That the Bombard was laden with susceptible goods and 'about fifty salms beans, for Malta.'"

Number of the Persons.	Days on which		Remarks.
	Were taken ill.	Died.	
One Hadji . . .	25 Feb.	27 Feb.	A bubo.
One	27 „	27 „	Petechiæ.
One of the Crew . .	8 March	10 March	Two buboes.

"1837. *Tunisian Xebeck 'Mishoud,' from Tripoli.*

"On the 2d of March 1837, the Tunisian Xebeck 'Mishoud,' Rages Homor, master, arrived from Tripoli with a foul Bill of Health, having ten persons in crew and thirty passengers; one of the passengers and one of the crew sick.

"The master deposed on oath, 'That he sailed from Tripoli on 'the 26th of February, bound for Malta, and that during the 'voyage two persons were taken ill.

"'That the cargo consisted part in susceptible goods, and part 'not.

"'The physician of the Quarantine department having visited 'the two persons reported sick, no marks of plague appeared on 'them, although the passenger was in his last moments, and in 'the course of the evening died. When inspected again in the 'morning, the symptoms appeared clearly on the body.'

Names of Passengers.	Days on which		Remarks.
	Were attacked.	Died.	
Antonio Buccagnano . .	. .	2 March	Carbuncle on the shoulder.
One of the Crew. . .	2 March	Cured .	Bubo on the left groin.

"Two of the crew of the above-mentioned 'Xebeck' attended and nursed their fellow sailor in free communication with him, and remained in perfect good health."

(One guardian placed on board.)

"1840. *H.M. Steamer 'Acheron' from Alexandria.*

"On the 27th of April 1840, Her Majesty's Steamer 'Acheron,' Lieutenant Kennedy, commander, arrived from Alexandria with a foul Bill of Health, in seven days, with forty-eight persons in crew and eighteen passengers; having brought the mails, several parcels and letters, and two horses; all well on board.

"On the 29th, early in the morning, the health guard, who was put on board the 'Acheron' on the day of her arrival, reported to the captain of the Lazaretto that one of the crew (a boy) during the night, at about nine p.m., died, and that one of the stewards was seriously ill.

"The commander received directions to land in the Lazaretto both the corpse and the sick steward, and having been duly examined by the Quarantine physician, evident symptoms of plague were observed on them.

Names of Persons.	Days on which		Remarks.
	Were attacked.	Died.	
William Martingall, boy .	27 April	28 April	Bubo and petechiæ.
Wm. Humphrey, steward.	27 „	2 May .	Bubo on the arm-pit and on the neck.

"The two persons who attended and nursed them remained quite well.

"The first case appeared in the cabin boy, William Martingale, fourteen years of age, on the 26th, while the vessel was at sea. This boy had free communication with the shore, and accompanied some Arab boys to the country on the 20th of April, the day previous to the steam vessel leaving Egypt. This case terminated fatally in forty hours from seizure, and the dead body was placed in the Lazaretto on the morning of the 28th of April, that the nature of the disease, which was then considered doubtful, might be determined.

"The steward also sickened on the 26th, he was removed into the Lazaretto, at the same time with the body of the boy.

"The assistant-surgeon was about this time (2d May) attacked with fever, and it was feared he had been infected, but it proved otherwise."

The above is in substance the observations made by Dr. Mahony, then P.M.O., in his annual reports of those years. He offers nothing regarding the ship "Mabruca" with which we are not already acquainted.

"1841. *Her Majesty's Frigate 'Castor,' from Kaiffa.*

"On the 9th of March, 1841, Her Majesty's frigate, 'Castor,' Edward Patey, Esq., commanding, arrived from Kaiffa in fifteen days, having had several cases of plague on board, as detailed in the following medical report:—

1841. A Report of Cases of Plague which have occurred on board Her Majesty's ship "Castor," between the 22d of February and the 9th of March 1841.

			Date of Death.
February 22.	John Barey . .	Boy	February 24.
„ 22.	John Treliver. .	. . . .	„ 25.
„ 22.	Thomas Chaplin .	Convalescent.	
„ 22.	Edward Efks . .	Boy	„ 24.
„ 23.	John Roberts . .	. . . .	„ 26.
„ 23.	Henry Boyd, boy .	Convalescent.	
„ 23.	George Campbell .	. . . .	March 2.
„ 23.	Stewart Robertson .	Convalescent.	
„ 23.	James Knight .	. . . .	February 26.
„ 23.	William Powell .	. . . .	„ 27.
„ 25.	Thomas Cork .	Convalescent.	
„ 25.	Joseph Lambert .	Boy	March 7.
„ 27.	John Crawfield .	. . . .	„ 8.

Total number of cases . . . 13
No. of Deaths 9
Convalescent 4

Remarks.

"Of the above cases those of Thomas Chaplin and John Crawfield, for reasons hereafter stated, may be considered doubtful.

"John Barey was embarked on board H.M.S. 'Castor' on Saturday, the 20th of February, and was taken ill on the 22d with symptoms of fever, on the 23d it was discovered that he had a bubo in the right groin.

"Treliver, Chaplin, and Efks were taken ill on shore on the same date with similar symptoms of fever, and embarked before there was any suspicion of the nature of the disease. On the 24th it was discovered that Treliver and Efks had each a bubo in the groin; Chaplin has never shown any other symptoms than those of mild gastric fever; but as a doubt many times existed, his case has been classed with the disease then prevailing. On the 23d, Roberts, Boyd, Robertson, and Campbell, were sent on

board, the three former having been seized the previous night, and Campbell the same morning. Knight and Powell were taken ill the same afternoon on board; all the ship's boys having been by this time embarked. Roberts never exhibited any other symptoms than those of malignant fever; all the others taken ill on the same date, displayed glandular swellings in the groins and axilla. Cork and Lambert were taken ill on board; the former had a tumour in one of the cervical glands, which has since suppurated. Lambert had one of the submaxillary glands affected, which terminated in sloughing; he had to all appearance subdued the original disease, but was carried off by the diseased state of the tongue and fauces, and the viscid secretions therefrom having produced sudden suffocation.

"Crawfield's case, at any other time, could not have excited any suspicion, but in the present instance, occurring under doubtful circumstances, has been classed with the other fatal cases. The symptoms had the greatest resemblance to delirium tremens, and indeed were treated as such.

"It will be observed that only one of the 'Castor's' crew has been attacked, and he was one of the several artificers who were quartered on shore with the 'Zebra's' men, and exposed to the same poison; and that the disease has hitherto happily been confined to those originally exposed to the contagion.

"No cases of plague had been known to have existed at Kaiffa, but cases had occurred at Acre; at which place a party of the 'Zebra's' crew had been stationed until the 12th of February, on which date, it has been since ascertained, that one of their number had died under very suspicious circumstances. The boys Barey and Lambert attended the diseased during their illness.

"The town of Kaiffa afforded ample space for the propagation of fever; and it is possible that the present disease may have had a local origin; but for the simultaneous occurrence of buboes in the greatest number of the cases, it was impossible to come to any other conclusion than that this was plague.

H.M.S. Castor,
9th March 1841. (Signed) HUGH JAMESON,
Surgeon.

"The sick were freely handled by four medical officers attached to both ships, and twelve sailors, without any precaution against contagion.

"(The sick were landed at the Lazaretto, with twelve attendants from the ship, and one guardian was put on board. The 'Castor's' crew consisted of 305 men, and there were eighty-seven men on board belonging to the 'Zebra.')"

"On the 26th of May 1841, the Ottoman brig 'Mabruca,' Rajes Omor Tituan, master, arrived from Alexandria with a foul Bill of Health, with fifteen persons in crew and 180 passengers, Hadjis.

"The master of the brig 'Mabruca' deposed on oath, 'That on 'the 8th of May, he sailed from Alexandria direct for Malta; that 'nine days after his departure one of the passengers died, and the 'corpse, without being examined, along with the clothes he had 'on, were thrown into the sea, but that the remaining clothes 'which belonged to him were consigned to his son, who was on 'board. That no other person was either sick, or had died 'during the voyage until he was in sight of Malta, when a Hadji 'and two Hadjias were reported sick; he further deposed that 'one of the Hadjias had been brought to bed of a boy.

"'That the ship was in ballast.'

"(The sick were removed to the Lazaretto, and one guardian was put on board the vessel. Before the 'Spoglio' two boatmen and four guardians were put over the parties landed, but the sick were nursed by three of their own people.)"

List of Persons who were attacked by the Plague on board the said Ottoman Brig "Mabruca" and whilst in the "Lazaretto."

Names of Persons.	Days on which		Remarks.
	Were attacked.	Died.	
Hadjia Fatima	26 May	28 May	Without external symptoms.
Had Inhamet Bin Ahmel	27 „	29 „	Bubo on the left groin.
Hadjia Aishia	28 „	28 „	Without external symptoms.
Had Ahmet	28 „	28 „	Without external symptoms
Had Kasan	28 „	Cured	Bubo under the shoulder.
Had Bin Serti, sailor	28 „	29 May	„ „
Had Hallet	29 „	29 „	Two buboes under the shoulder.
Hasan, sailor	4 June	6 June	Bubo on the groin.
Habdalla, sailor	6 „	Cured	Bubo under the shoulder.
Had Imhamet	6 „	8 June	Without external marks.
Hurschi, the master's son.	8 „	11 „	Bubo on the groin.
Inhamet Bin Ibrahim	8 „	Cured	Bubo on the shoulder.
Giovanni Cauchi, a Maltese boatman, who was put in quarantine from pratique with the Hadji on the 28th of May	7 „	11 June	Bubo on the groin, and carbuncle on his back.

"On the 24th of June 1841, the Austrian brig 'Nazaret, Deodato Vucassovich, master, arrived from Alexandria with a foul Bill of Health, having nine persons in crew and ninety-seven passengers, Hadjis.

"The master of the brig 'Nazaret' deposed on oath, 'That 'he left Alexandria on the 3d inst., with his present crew and '105 passengers, in ballast, and came direct to Malta to perform his quarantine, and then proceeded to Tangier, for which place he was bound.

"'That during his voyage eight Hadjis died, and their bodies having been examined, no marks of plague had been discovered on any one of them, and that the bodies were thrown overboard the day of their death, and that the casualties had taken place as follows, viz. :—

"A Hadji died on the 5th June	A Hadji died on the 15th June
" " 8th "	" " 20th "
"A Hadjia died on the 10th "	A Hadjia died on the 20th "
" 14th "	" " 23d "

Eight individuals.

List of Persons who were attacked by the Plague whilst in the Quarantine Harbour, from the Austrian Brig "Nazaret."

Names of Persons.	Days on which		Remarks.
	Were Attacked.	Died.	
Hag Imhamet Bin Semil -	1 July	2 July	Bubo under the shoulder.
Giovanni Petronio, sailor -	2 "	6 "	" "
Health Guard, Vincenzo Bartolo, put in quarantine on the 28th with the Hadji - - - -	4 "	Cured	Besides the general symptoms, a swelling under the shoulder.

(One guardian, Allessandro Merini, was put on board. Bartolo was one of the guardians placed over the passengers landed in the Lazaretto.)

Ottoman Brig 'Mabruka,' Georgiana,' from Alexandria.

"On the 8th of July, 1841, the Ottoman brig 'Mabruka 'Giorgiana,' Imhammet Hadded, master, arrived from Alexandria in thirty-seven days, with a foul Bill of Health, with fifteen persons in crew and seventy-two Hadjis, laden with about 200 bales of linen and flax, 900 ardep of beans, and other articles, bound for Malta.

"The master deposed 'That good health was enjoyed on board during the whole of the voyage.'

Names of Persons.	Days on which		Remarks.
	Fell Sick.	Died.	
Had Mustafa - - -	8 July	13 July	Dysentery.
Saha, sailor - - -	13 „	18 „	Inflammation of the brain.
Had Hali Bin Illifa - -	13 „	21 „	„ „ bowels.
Had Hascal, sailor - -	24 „	25 „	Pestilential bubo.

A true Extract.

(Signed) E. Bonavia,

Superintendent of Quarantine and Mar. Police.

In addition to these declared plague ships, 3,199 vessels have arrived within the same period from suspected ports with foul bills of health.

It appears from the above records, that since 1813, plague has been imported into Malta twelve times, without any extension of it to the population; and there is nothing to shew that on those occasions quarantine was more rigorous than in 1813. The health guardian who was embarked on board the "Sta. Trinita," and the two persons who attended and nursed the sick (all from pratique) were not attacked. In the "Costanza," of five persons (from pratique) who were put on board for depurating the ship and landing the cargo, two were attacked, but recovered. On board the "Mishoud" two of the crew, who nursed and attended their fellow sailor, in free communication with him, remained in perfect health. In the cases from the "Acheron" a similar impunity is noted—but the health guardian placed over the passengers from the brig "Nazaret," in the Lazaretto, where there were ninety-seven Hadjis, (or pilgrims,) did not escape an attack supposed by Dr. Gravagna to be "a slight case of plague."

The attack of one of two boatmen, who were sent, from pratique, to attend to the wants of the 180 Hadjis, disembarked from the brig "Mabruca" in May 1841, was considered by Dr. Gravagna, principal physician of quarantine, as conclusive of the transmission of the disease by contact. This man, Giovanni Cauchi, was put in quarantine with the Hadjis on the 28th of May, and with eight others assisted them, and was in communication with them in the Lazaretto from 7 a.m. to 8 p.m. of that day, but it does not appear that he ever was on board the brig, or in contact with the sick. I have taken much pains to ascertain every circumstance connected with this case. Antonio Chevalier, a

health guardian, and the surviving boatman, Philippo Felice Saliba, who were with Cauchi, both state that 150 of the Hadjis were put into a large room, and the remainder into a smaller one adjoining the Lazaretto, on the morning of the 28th, and were there till the following morning—that the windows of the former room are about twelve feet from the floor—that the same night, about nine o'clock, Cauchi and his fellow boatman, entered the rooms where the Hadjis were, for the purpose of searching for two missing keys, and remained about ten minutes questioning them concerning these keys—and that two days afterwards these two men were employed for about an hour in sweeping the rooms after they had been vacated by the Hadjis, but before they were fumigated. Gabriel Cauchi, father of the deceased Giovanni Cauchi, confirms this statement, Admitting Cauchi contracted this disease from an atmosphere polluted by 177 filthy beings* shut up in close rooms for twenty-four hours, previous to the Sp**o**glio, in consequence of greater constitutional susceptibility than his companion, who was exposed under similar conditions, this is no proof of a specific cause. Seven others in communication with the Hadjis in the open air, encountered such exposure with entire impunity.

The first report of Dr. Gravagna on this case is as follows:—"8th "June 1841, morning. Yesterday a boatman, named Giovanni "Cauchi, showed me a boil on the back which has this morning "burst; the *boil* does not appear of a *pestilential kind*, but this "morning he is feverish and had some vomiting. 9th. Is worse "this morning. 10th. Had an exacerbation of fever last evening, "accompanied with delirium. This morning there appears to be a "remission, but he walks with difficulty and staggers. The *boil* "reported on the 7th (8th?) is discoloured, brown and flat; "besides he feels a pain in the left arm-pit, though no swelling is "yet visible. All these symptoms, together with a fever of a "serious and malignant character, induce me greatly to suspect "that the disease must be regarded as plague. 11th. Is dying. "12th. The boatman, Giovanni Cauchi, aged 24, of Valetta, died "this morning at four o'clock, presenting on his body a bubo in "the arm-pit and a carbuncle of the same character of the carbuncle of plague." The above details show that Dr. Gravagna had no grounds (the after-alleged source of the disease is not specified) for his final conclusion, except the aggravation of the disease. No written report is made on the 7th, when the doctor first saw Cauchi. He calls the *boil* not pestilential, and remains apparently without suspicion till the 10th, notwithstanding that all the

* The dress of the Hadjis, a sort of a loose toga, consisting of a thin woollen stuff, is rarely changed or washed from the time they leave their country till they return to it.

symptoms were daily increasing. Similar cases occur in Malta; and to show this more clearly, I may refer to six cases, reported about the same time, which were more or less connected with the same ship (the "Mabruca,") or, perhaps, the same *season.* The first was Antonio Mifsud, the guardian over the pilgrims and crew. On the 13th of June, he presented "an inflamed boil" which had "neither the form nor appearance of pestilential "carbuncle," without fever. The second was Gabriel Cauchi, father of the boatman, who on the 14th of June, had three "small boils" on the superior and anterior part of the left thigh, without fever, and presented "no suspicious appearance of plague." The third was one of the crew employed as a depurator in the Lazaretto on the susceptible cargo. On the 25th of July he presented "two small boils" on the right leg, with "pain of head and febrile "heat." In consequence, it would appear of this last symptom, Dr. Gravagna suspends all judgment, and states "at present I am "unable to offer any opinion." Three more of the crew similarly employed were attacked with fever, two synocha, and one bilious, without external eruption. All these six cases rapidly recovered. No further suspicion or allusion to their origin appears.

Here then the absence of fever in the two first cases determines the diagnosis; the external disease, considered the *sine qua non* proof of pestilence, being disregarded; the presence of fever in the third, in conjunction with external disease of no greater severity, renders the case doubtful and requiring further observation; while fever places the three last cases in a totally different category. It is pretty evident from this, that Dr. Gravagna rested his conclusion on Cauchi's case, chiefly on the degree of disease, the evidence of exposure to the alleged cause in all the other cases being equally admissible. But there were no circumstances in one more than in another of them to justify the suspicion of transmitted disease, all being within the precincts of the Lazaretto, which was not the the only place in Malta remarkable this year for extraordinary sickness. According to the same register, there were 119 cases of fever among the shipping, of which eighteen died. Ninety of the former and ten of the latter were either under the disease, on, or attacked after, arrival in Malta. The number of cases is treble that of any other year, except 1840, (also remarkable for plague ships), in which there were seventy-one attacks, and eighteen deaths in the shipping. Moreover, the number of fatal cases of dysentery in those ships co-existing with cases of fever, as well as the unusually frequent use by Dr. Gravagna of the terms, bilious remittent, bilio-gastric, icterodes, and nervous fever, declare the presence of more energetic causes for the occurrences, than any proved communication in the Lazaretto with cases of plague. I would ask on what grounds the other cases are excluded from the

category in which Cauchi's case is placed? Is it quite beyond dispute that plague possesses a specific virus sufficing for its extension independently of local and other conditions? Where does the line begin that separates plague from ordinary anthrax and fever? This claim for plague of a distinct and separate poison, while fevers in the same harbour and in the whole population afford indications of a wide spread cause, is simply to assume a distinction before a difference has been proved to exist. I believe the benign fever among the troops, and anthrax in the civil population are the modified results, under different conditions, of the same general cause, though the features of the disease be varied. The case of Cauchi in the Lazaretto has been differently interpreted, and apparently on no better grounds. Does plague admit of no such modifications? Let us see. In the seventy-seven cases on board the twelve plague ships, we find thirty-seven with bubo, five with carbuncle, five with petechiæ, four with tumour, and four with carbuncle and petechiæ, four with bubo and petechiæ, and one with bubo and carbuncle, while no less than seventeen cases present no external marks whatever. What symptoms did these cases show different from ordinary fever? None; except in their being preceded or associated with cases having outward disease, and therefore called plague.

Another point is, that in the "Acheron" (1840) the cases of plague showed themselves seven days after the ship's departure from Alexandria, on the day of arrival in Malta, and in the "Mabruca" (1841) only one suspicious case occurred, nine days after leaving; whereas twelve cases, exclusive of Cauchi's, took place, an interval of from eighteen to thirty days having intervened after communication with Alexandria; showing that the port of arrival, rather than that of departure, is to be suspected.

It appears that the cabin-boy in the "Acheron" had gone into the country at Alexandria with some Arabs; and it is not improbable that the steward had also been on shore.

The only other point of interest connected with these ships is, that they all arrived between the 22d of February and the 8th of July, corroborating general experience, how much the disease is dependant on season. It is also worthy of remark, that all, except the Russian frigate "Castor," had left places suffering from the plague.

From the foregoing I would draw the following deductions:—

1st. That there is no evidence to prove, or even to render it probable, that the plague was introduced either into Malta in 1813 or into Gozo in 1814 by importation.

2d. That there is every reason to believe that the plague existed in Malta at the time of the arrival of the ship supposed

to have introduced the disease; and that in Gozo the first case (a stranger) contracted the disease from local causes, which, enhanced by quarantine, produced it in others.

3d. That the lower orders, and those occupying the lowest, most crowded, and worst ventilated dwellings, furnished the great majority of cases; which decreased in proportion with improvement in these respects.

4th. That as this discriminative preference of the disease to attack certain classes, living in certain localities, never obtains to the same extent with diseases arising from a specific contagion, it is more than probable that the causes engaged in the generation of the plague are not constant, but variable and accidental; its initial cause, the peculiar atmospheric constitution having no power to develop the disease, unassisted by season and local conditions.

5th. That the transmissibility of plague from person to person out of the noxious atmosphere in which it originated—the only certain test of such a power—has not been proved by the four instances, during thirty-eight years, in which it is alleged to have been communicated to persons employed by the Quarantine Department of Malta, carbuncular affections being endemic among the population of this island.

6th. That quarantine restrictions enforced by the penalties of *corporal punishment* and *death*, and seconded by the greatest dread of contact with suspected persons or things, among the panic-struck populations of Malta and Gozo, utterly failed to arrest the progress of plague; on the contrary, where these restrictions were carried to their utmost limits by an absolute power, there the disease persisted longest, and the mortality was greatest.

(Signed) W. H. Burrell, M.D.
Staff Surgeon 1st Class, P.M.O.
Malta, 12th of Oct. 1852.

To the General Board of Health.

NOTE A.

EXTRACTS from PROCLAMATIONS issued for the enforcement of QUARANTINE at Malta, in 1813.

The following short extracts from these proclamations will convey some notion of the stringency with which quarantine was enforced, particularly in Valetta and Floriana, where they were carried out to the letter. They are well deserving of perusal, and the attention of all interested in the subject of plague; for to them may be fairly ascribed much of the sufferings in 1813.

5th May.—Embargo continued on the shipping—the courts of judicature, the theatre, and other places of public resort closed—the respective offices of government limited to indispensable exigencies—medical persons, aided by other responsible inhabitants, to visit the districts allotted to them.

7th May.—Persons appointed to visit the several quarters of the town, and the lieutenants and other persons appointed for districts to consider themselves branches of the Board of Health, and to report to that Committee in order that means may be taken to punish the disobedient—dogs and cats to be kept in their respective houses—crews on board of ships to consider themselves in quarantine—to avoid all intercourse and crowding—no one permitted to sell linen in the streets—no one allowed to beg.

10th May.—The masters of the principal part of any house to watch *the families in the* mezzonini's and of the lower apartments (?)—to purify every house in the island, and to burn all useless clothes and rags.

12th May.—Recommendation to the inhabitants to remain shut up in their houses, or, being obliged to go out, to avoid touching any person or thing that can convey infection—to employ a person who is not admitted into the house to purchase the necessaries of life—to have a tub of water at the door into which meat and vegetables are to be thrown and well immersed previously to being touched by the family—money to be passed through vinegar—bread if received hot to remain untouched till cold—papers to be smoked—linen to be *washed in the house*, and such as may already have been given out, to be received in water and remain therein at least 12 hours before

it is touched—the chief of every family to enforce those on his dependants, and those not conforming to be allowed to quit the house.

15*th May.*—*Prohibited throwing nuisance into the street under a penalty of eight ounces*—recommends that every one should avoid all intercourse, and to keep themselves retired and at a distance from all unnecessary or incautious communication—the punishment of death to any one concealing the disease.

19*th May.*—Ordered "that those who cannot show a reasonable and well-founded motive for leaving their houses, will be considered *disobedient, and punished by the police magistrates.*" Recommends a general purification of clothes and houses.

21*st May.*—Accommodation provided for healthy persons from infected houses.

22*nd May.*—Communication with the shipping to cease after sunset—no boat to ply after eight o'clock—no passage boat to carry more than five persons—the Marina Gate and wicket to be shut after eight o'clock.

24*th May.*—A reward of 400 dollars for the detection of "those endeavouring to defeat the beneficent intentions of Government."

29*th May.*—No person to change his place of residence or to admit any one to become an inmate without permission—all shops to be shut from sunset till six o'clock in the morning—no shop to be kept open during the day without a written authority.

From sunset till sunrise all the inhabitants are to remain in their respective houses—all the foregoing to be observed "under the pain of incurring the punishment awarded to a breach of the quarantine laws."

1*st June.*—No person to go beyond the limits of the district (?) The deputies to prevent all persons from assembling, and to prohibit every unnecessary communication between families (?) Any acting in disobedience to these orders to have their whole family placed in the most rigid quarantine. All commercial operations not indispensable to be suspended. The lining of calesses to be removed.

12*th June.*—No one to pass to Vittoriosa, Senglea, or Cospicua.

15*th June.*—No one to leave his ship without a written permit. No person to be permitted on board any ship. When any person is taken ill no one to leave the ship until the case is reported to the visitors.

19*th June.*—That money shall be passed through vinegar; and many recommendations as to all kinds of food.

29*th June.*—Extraordinary Council of Health established, at which the Governor presides.

8*th July.*—All vessels in port to be considered in quarantine, "and no hired boat to approach them unattended by a guardian from the Health Office."

11*th July.*—All passes to cease to be valid from the 14th instant.

13*th July.*—All communication suspended in regard to the towns of Vittoriosa, Senglea, Cospicua, and Calcara of Vittoriosa, between each other and all parts of the island. The communication between Valetta and Floriana to cease.

17*th July.*—"No person residing in Valetta or Floriana shall go abroad even within the limits of his respective district, unless *between the hours of* 6 *and* 10 *o'clock* in the morning, each of which hours will be notified by the sounding of the great bell of St. John's church." That between the above-mentioned hours all unnecessary communication is to be avoided. Only one person from each family to be permitted to go to the market of the district. "That at the expiration of the time above specified the venders at the different markets shall quit their stalls; the shops shall be shut, and all the inhabitants shall be obliged to *retire within their respective places of abode until the following morning.*"

16*th July.*—Pigeons, fowls, and poultry of every description to be confined, and cats, dogs, and other animals to be prevented going out. No clothes of any description to be exposed in the balconies, windows, or doors. Persons transgressing any of the articles in the proclamation to be arrested, and rendered *liable to corporal punishment.*

1*st August.*—The punishment of death to any person changing his residence without special permission from the Council of Health; the same to any one concealing their illness; the same to persons guilty of entering an infected house; the same to persons wilfully concealing the illness of others; the same for the concealment of any article ("even though not susceptible of infection.")

2*nd August.—All permits, whether to town or country,* to cease. That the proclamation of the 17th July authorizing persons to go out to market between the hours of 6 and 10 in the morning *be annulled,* "and *that no inhabitant of Valetta or Floriana,* with the exception above provided for, *shall be at liberty to go abroad into the street, without subjecting himself to the most prompt and rigorous punishment awarded by the laws of quarantine.*"

4*th August.*—That "the inhabitants of each district be invited to form themselves into a guard for the maintenance of good order, cleanliness, and the strict observance of quarantine."

10*th August.*—"No person to shoot or go out in the pursuit of game under the severest penalties."

17*th August.*—Antonio Borg shot for having been discovered concealing the pestilential disease with which he was affected.

22*nd August.*—Considering the number of hands required for the cotton harvest, prohibits every one, under the severest penalty, from gathering it, but orders it to be consumed by the cattle.

25*th August*—That all the cotton of this year is to be considered an infected article.

27*th August.*—Population prohibited buying fruit at the barriers.

10*th September.*—Cordons of troops ordered to surround the casals of Zebbug, Birchircara, and Curmi.

4*th October.*—Congratulates the inhabitants on the declension of the disease.

NOTE B.

Returns from Hospital Records, &c., of Cases of Carbuncular Affection in Malta.

The following Return, which I have framed from the registers of the civil hospital, shows the number of cases admitted, from 1821 to 1843 inclusive, under the terms of "anthrax," "carbuncle," "furunculus," and "boil," the various names apparently applied to the same disease by different surgeons. "Pustula," "tumor," and "tubercle" occur frequently in these registers, which I have excluded, though, judging from the time in hospital and number of deaths, they evidently embrace much acute disease of an eruptive character.

The cases under the former heads were in adults, many of them young, but the majority middle-aged and old. Several appear to have been slight, but the duration of the malady in the greater number bespeaks severe disease.

I have appended the number of males admitted under all diseases in the month of July of the several years. The relation in numbers between these and the admissions with "anthrax" is not remarkable. The fluctuation in the number of the latter deserves more attention, and I may remark, that unless anthrax was brought under some other head, the three years preceding 1821 seem to have been nearly exempt. The small number of other diseases these years is also remarkable, the admissions of males in July being 83, 130, and 99.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Died.	Admission of Males into Civil Hospital in July of each Year.	Arrival of Ships with Plague.
1821	.	.	3	1	.	.	1	1	2	3	2	2	15	1	84	One.
1822	1	.	.	.	1	.	3	.	1	1	.	.	7	.	128	
1823	.	.	.	1	.	.	.	.	.	2	.	.	3	.	131	
1824	1	.	.	4	1	3	1	.	.	.	.	.	10	1	143	
1825	.	.	1	.	.	.	.	.	.	.	.	.	1	.	141	
1826	.	1	.	.	.	.	1	.	.	.	.	2	4	.	171	
1827	6	.	.	.	.	.	.	.	.	.	1	1	8	.	168	
1828	2	2	.	4	1	.	1	7	.	.	.	1	18	.	182	One.
1829	.	1	1	1	1	1	.	.	.	1	.	3	9	.	110	
1830	1	1	2	1	.	1	4	2	.	1	.	2	15	1	187	
1831	.	1	1	1	2	.	2	2	.	1	1	3	14	.	222	
1832	4	3	1	1	2	4	1	.	3	.	.	3	22	1	188	
1833	7	6	7	5	6	7	3	2	4	3	1	2	53	1	281	
1834	2	1	5	1	3	3	3	4	3	1	2	2	30	1	207	
1835	2	5	2	.	.	3	1	3	3	.	.	.	19	.	239	
1836	1	2	1	2	1	3	1	.	.	1	.	.	12	.	217	
1837	3	.	1	5	2	1	2	1	1	4	.	.	19	.	203	Three, and
1838	2	1	2	1	1	.	1	.	1	1	1	2	13	.	231	epidemic
1839	8	1	3	3	4	3	3	7	2	3	2	2	41	.	202	cholera.
1840	.	2	1	.	3	5	4	8	5	1	3	2	34	.	278	One.
1841	3	1	2	2	4	3	4	4	8	4	1	.	36	1	284	Four, and
1842	1	1	3	1	2	2	.	4	5	2	1	.	22	.	249	wide spread
1843	1	.	3	2	1	2	3	6	2	1	1	4	26	.	234	fever in all
																classes.
Total	45	29	39	36	35	41	39	51	40	29	16	31	431	7	4,410	
	149				166				116							

It will not escape notice that of the fifteen Plague ships which arrived in Malta since the English took possession, eleven arrived in well-marked epidemic years in the island, namely, three in 1813, three in 1837, one in 1840, and four in 1841. I have made most diligent search for the registers of the civil hospital for 1812 and first quarter of 1813, but without success. It is therefore probable that, like some of the valuable tapestry in the governor's palace, they were considered suspected, and destroyed.

RETURN of Cases of ANTHRAX in MALTA and GOZO, from 1st January 1850 to 31st August 1852, taken from the Records of Dispensary Practice.

MONTHS.	1850. No. of		1851. No. of		1852. No. of		Total Number of		Showing the comparative prevalence in Winter, Summer and Autumn.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
January . .	24	..	24	4	9	..	57	4	238
February . .	31	..	12	..	22	..	65	..	
March . .	24	1	24	..	21	..	69	1	
April . .	14	..	19	..	14	..	47	..	
May . .	23	..	23	..	20	1	66	1	316
June . . .	31	..	28	..	29	1	88	1	
July . . .	16	..	28	1	31	1	75	2	
August . .	21	1	28	2	38	1	87	4	
September. .	24	1	26	..	..	..	50	..	140
October . .	4	..	27	..	..	..	31	..	
November. .	7	..	17	..	..	..	24	..	
December . .	16	..	9	1	..	..	25	1	
Total . .	235	3	265	8	184	4	684	15	

(Signed) J. B. H. COLLINS, M.D,
Inspector of Civil Charities and Prisons.

Dr. Calleja, physician to the police establishment, has furnished me with the following table and remarks, which are important, the cases having generally occurred in the reputed haunts of Plague:—

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Died.
1850	..	1	4	2	1	1	1	..	..	..	1	1	12	2
1851	2	2	..	1	..	5	5	3	1	1	1	..	21	2
1852	2	2	..	..	3	4	4	7	..	..	..	..	22	1
Total	4	5	4	3	4	10	10	10	1	1	2	1	55*	5
	16				34				5					

* The majority of these are included in the preceding return.

"The cases of anthrax I observed in the district of Valetta, from the 1st of January 1850 to the end of August 1852, amounted to fifty-five, as shown in the above table. Twenty-two of these cases were serious, the others rather trifling. Of these serious cases I sent five to the Central Civil Hospital, of which three proved fatal.

"Cases of anthrax in Malta appear rather in summer than in winter, more in males than in females; in persons of low condition and of sickly appearance, dwelling in damp places, as the Mandraggio and Strada Pozzi.

"The cases in Valetta appeared to be caused by want of proper food, filth, and long sickness. Three cases under my care were followed by death, and two others were reported to me by other doctors.

"The first fatal case I observed was in a rather stout and robust man of sanguine temperament, aged 74, who lived in Strada Toro, together with many other persons. He had an anthrax of considerable extent on the right shoulder, and it affected a portion of the muscles of the vertebra. He died after fourteen days of sickness with symptoms of *encephalitis*.

"The second case occurred in the Mandraggio, in a man 36 years old, of delicate appearance. He presented an anthrax on the right side of the loins, which also affected a portion of the vertebra. He died under excruciating pains, on the 27th day of his illness.

"The third case was in a woman, aged 66, of lymphatic temperament, living in the Mandraggio. She had an anthrax on the nape of the neck, and expired on the 22d day of her illness, under nervous symptoms.

"Two other fatal cases were reported to me by other doctors The first was in a consumptive man and the other in a butcher. They both died under nervous symptoms.

"The above fifty-five cases of anthrax appeared in the following streets:—

*Mandraggio	17
*Strada San Patriizo	2
* ,, ,, Marco	2
*Strada Reale, near St. John's Church	1
,, Stretta, under the Main Guard	2
,, Mercanti, near to the Castellania	1
* ,, San Domenico	1
* ,, Del Toro	2
* ,, San Carlo	1
* ,, Pozzi	3
* ,, St. Ursula, near Strada Pozzi	2
* ,, Federico	1
* ,, San Guiseppe	2
* ,, Fontana	2
Without any houses	8

viz., three in the police station, an English sailor, and the others mendicants.

"Of the others we have only their names and ages, not having appeared more than once at the public dispensary.

(Signed) "F. Calleja, M.D."

Dr. Portelli, Physician to the Civil Hospital, communicates to me the following:—

"The number of cases of carbuncle treated by me in my private and hospital practice during the last 20 years amounts,

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* All the streets marked with * were notorious for numerous cases of Plague in 1813—See map 2.

as near as my memory serves, to 120. The majority of the individuals among whom this disease occurred were poor, and between the ages of 50 and 70, some of them habitually addicted to the abuse of intoxicating liquors, and the greater number living in low damp places. The situations of these tumors were generally the inferior part of the neck, between the shoulders and the loins, varying from the size of a pigeon's egg to a circumference of 8 inches, and preceded by rigors, headache, prostration of strength, nausea, and in some cases by vomiting and want of sleep. These symptoms were very soon succeeded by fever, by the eruption of carbuncle, slightly elevated typhoid symptoms, and in some cases with delirium and death. These symptoms were invariably protracted in their course.

"Carbuncle is not a common disease in this island, but mitigated forms of anthrax are commonly to be met with."

Dr. Bardon has furnished me with the following :—

DEAR SIR, *Malta, 27th August* 1852.

WITH regard to cases of anthrax and carbuncle, I beg to reply to your questions as follows :—

From my registers I find that, in 1821, I treated in the Lazaretto of Malta, eight individuals under the above disease, and have transcribed their clinical history. From that you will perceive that the sufferers belonged generally to the poorer class and that five cases recovered and three died.

From the situation and symptoms it appeared that these cases were those of mild Plague.

Anthrax is a prevalent disease in Malta, particularly in summer, and when attacking weakly subjects is almost always fatal.

I am, &c.,

SALVAT BARDON, *M. Chirurgo.*

Case 1.—"Salvatore Spiteri, æt. 27, porter, of strong constitution ; was attacked 25th March 1821, on getting out of bed, with severe pain of head, rigors, fever, white tongue, thirst, inclination to vomit, and general debility. 26th. Pain in the right groin and glandular swelling, prostration, and bilious vomiting. 27th. Restlessness and constipation, relieved by purgative, and followed by much diminution of fever and of the general symptoms, and at the end of 10 days was perfectly recovered.

Case 2.—"Saverio Zammit, æt. 30, tailor, of spare habit; attacked 28th March, on getting out of bed, with general debility, pain of head, vomiting, rigors, fever, and inflammatory irritation in the left ham, with pain in the corresponding groin. Purgative and cataplasm prescribed. On the 3rd day abatement of symptons and irritation of ham disposed to suppurate. 4th day, tumour suppurated and opened, with subsidence of all the symptoms; and on the 12th day cicatrization of tumour and recovery.

Case 3.—" Lorenzo Attard, æt. 37, porter, of strong and robust constitution; attacked 29th March, on getting out of bed, with severe pain of head, general debility, fever, and delirium, with a carbuncle on the right shoulder. On the second day another carbuncle appeared on the upper part of right side of neck. 3rd day, rapid aggravation of symptoms, general prostration and coma, under which he died. Body livid and covered with petechiæ, particularly on the breast and lower part of abdomen.

Case 4.—" Michele Bartolo, æt. 32, boatman, of weak constitution; attacked 30th March, on getting out of bed, with severe pain of head, rigors, fever, and vomiting. 2nd day, aggravation of symptoms, bilious vomiting, severe pain of head and continued delirium. 3rd day, extreme debility, coma, total prostration of strength and death. Body livid, a few petechiæ scattered on the inferior extremities, and a quantity of white froth from mouth and nostrils before death.

Case 5.—" Vincenzo Capar, æt. 39, tailor, of strumous diathesis; was attacked 1st April, on getting out of bed, with pain of head, pallor of countenance, rigor, bubo in right groin, and incipient carbuncle on the left superior part of back. 2nd day, vomiting of greenish matter, delirium and extreme debility. 3rd day, carbuncle and bubo larger, but with aggravation of symptoms; vomiting of black matter and looseness of bowels; and on the 7th day, under a rapid increase of symptoms, and black petechiæ over the whole surface, he ceased to live. Body livid; contraction of the superior and inferior joints, and a gangrenous eschar over the surface of the carbuncle.

Case 6.—" Vincenzo Vella, æt. 30, shoemaker, of rather weakly condition; attacked on the evening of 5th April, with rigors, fever, thirst, and constipation. 2nd day, copious alvine evacuation of black and fetid matter, abatement of symptoms, and on the 7th day was perfectly recovered.

Case 7.—" Giuseppe Inguanos, æt. 18, porter of bilious temperament; attacked on 10th April, on getting out of bed, with rigors, fever, flushed countenance, and vomiting. 2nd day, bubo at the internal and superior part of right thigh. 3rd day,

bubo inflamed, painful, and more elevated. 4th day, abatement of symptoms, bubo matured, opened, and discharging abundant purulent matter. 6th day, progressing favourably. 10th day, remission of symptoms, bubo disposed to cicatrize, and on the 13th day was quite well.

Case 8.—"Fortunato Debona, æt. 27, porter, a strong constitution; attacked 12th April, on getting out of bed, with severe pain in the lumbar region, weakness of limbs, cold shivering, fever, paleness of countenance, white tongue and bubo in the left groin, advancing to suppuration. 2nd day, bubo suppurated and opened, followed by abundant discharge and relief. On the 10th day the bubo cicatrized, symptoms disappeared, and the patient perfectly recovered."

Dr. Bardon states that the above were from "Alexandria." They were all natives of Malta. These cases are interesting as showing the wide range of symptoms. They are authentic, and valuable as being connected with one of the Plague-ships, and showing a similarity to undoubted Plague.

Dr. Bardon freely handled the above cases, considering himself protected by his attack in 1813.

Sufficient has been adduced, I think, to show a decided disposition in the inhabitants of Malta to carbuncular disease and eruptions of a similar kind, ranging from the common furunculus of the young, or those healthily placed, to the aggravated carbuncle of the old and sickly, or those living in filth and misery.

How many of the above cases were sporadic cases of Plague, or closely allied in their nature to that disease, I will not stop to inquire. But there is sufficient, I think, to support the belief that the climate and subjects that can in ordinary years produce carbuncle to the extent here shown, will be capable under abnormal conditions to multiply indefinitely its numbers and virulence. Whether the disease in its exalted form acquires new attributes, or claims a different name, I leave for others to determine; but being still chiefly found in the same classes and localities, in the same seasons, and marked by a similar febrile action, it is here probably necessary to guard against the common error of mistaking degree for radical differences—the occasional aggravation of indigenous disease for a new and imported one.

Carbuncle would appear to be nearly constantly present as an endemic disease in Malta.

The periods between 1847 and 1850 inclusive, particularly in the three last years, the disposition to cholera was marked and decided. With the military there were 38 deaths in 1848, 8 in 1849, and 135 in 1850; and in the latter year 1,764 deaths from the same disease occurred among the civil population.

In the autumn of 1847 a severe and wide-spread influenza in all classes carried off 81 civilians; and in the autumn of 1849 a destructive epizooty appeared among the oxen, destroying 750 head.

Carbuncular disease, though still appearing in these years, seems to have its own appropriate conditions, and the great mortality from that and fever in 1846 would appear to indicate, to some extent, a common cause. 1846 was also remarkable for a more than usually complicated and fatal fever among the troops.

From 1848 to 1850 the number of cases among the troops under the general head of "Phlegmon" was remarkable. namely, 1,357; the three preceding years only yielding 427.* Dr. Gulia, of Cospicua, a poor and densely crowded district, informs me that from 1846 to 1850 inclusive, he treated 89 cases of carbuncle, six of which proved fatal, and by far the greatest number of them were in the same streets that were chiefly infested by plague in 1813. In 1851-2, years most remarkable for the absence of epidemic disease, he met with 35 cases, but all of a benign character.

In ordinary years, according to Dr. Calleja, malignant fever is not so much found among the subjects of carbuncle as in those under somewhat better circumstances.

Fever is never absent among the military in summer. It varies considerably in the number of cases in different years, but little in character, except in particular seasons, when it rises into a very malignant remittent, with no tendency to the intermittent, which is almost unknown as an indigenous disease.

In the several invasions of the Plague in Malta, it will be observed that, like carbuncle, it has prevailed at all seasons. but more especially in summer. In 1655, when only 20 persons died, it commenced, and terminated in the last quarter of the year. In 1675-76 and 1813—severe visitations of plague —it commenced in the former in December, in the latter in March, attained its height, in both, in the hottest months, and declined in autumn. So far plague and the ordinary carbuncle of Malta resemble each other, and the cases furnished by Drs.

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* Dr Calvert states that in 1813, in the 14th Regiment, every whitloe festered and every scratch became an ugly sore; a tight shoe was sufficient to produce a livid boil, and the military hospitals were crowded with them. From this it would appear that the 14th Regiment, though free from decided Plague, was not exempt from some assimulating influence: thus pointing to the conclusion that Plague, like other pestilences, has probably smaller and more equivocal beginnings than we are generally inclined to admit.

Calleja and Gulia can leave no doubt of both diseases being found in the same localities and among the same class of subjects.

Years.	Deaths from Anthrax.	Deaths from Fever.
1846	22*	121
1847	3	112
1848	4	65
1849	1	86
1850	3	51
1851	8	50

* Two more than died in the Plague of 1665, but probably being more scattered attracted less attention.

NOTE C.

NOTE of the Amount of EXTRAORDINARY EXPENSES incurred by the Civil Government of Malta in consequence of the Plague, during its prevalence in the Years 1813 and 1814.

	Maltese Scudi.
Disbursed by the Treasury of Government, in the pay of health officers, clerks, guards, physicians, surgeons, expurgators, scavengers, funeral attendants, and workmen; in the erection and repair of barriers, huts, cemeteries, and other works; in alms to the poor, care of the sick and suspected, drugs, funeral charges, and various other exigencies - - -	1,794,625
Disbursed by the Jurats of the University (Grain Concern), namely, for the accommodation and maintenance of persons detained under observation in Fort Manoel and its confines, from 8th May 1813, to 30th April 1814 - - - - - -	Scudi. 62,527
For the accommodation and maintenance of the suspected persons encamped in the garrison ditches outside of Port Reale, St. Anna, and Bomb, and of the patients in the temporary hospitals in the ditches, from 20th June to 11th October 1813 - - - -	26,074
To the deputies of the eight sanitary districts of Valetta, for their disbursements on account of the maintenance of the indigent persons confined to their houses in the several districts, from the 27th June to the 30th September 1813 - - - -	44,325
Paid by the Jurats for the cost of wine, provisions, fuel, and oil, being portions of those delivered for distribution for the use of the suspected persons and patients confined in Fort Manoel, the ditches of the garrison, and other places - - - - -	21,167
Miscellaneous disbursements for various services connected with the supply of the inhabitants during the epidemic - - -	12,079
Cost of bran and dry clover, for the food of cattle belonging to private individuals detained in quarantine in the receptacle at Casal Curmi - - - -	8,087

	Scudi.	
Cost of bread, fresh meat, wine, and other articles of provision, furnished by various parties, for the use of the persons confined to their houses or in other places - -	220,669	
Cost of bread and meat supplied to persons confined in Casal Curmi - - -	3,612	
Value of 9,352 salms of wheat issued from the University granaries, and administered in alms to the poor of both islands through the agency of the Lieutenants of Casals, the store-keepers of the University (under the direction of the Jurats), and the Charitable Committees - - - - -	372,149	
Value of other articles of provision issued from the University stores for the same purpose - - - - -	18,371	
		789,060
In all, by the Civil Government - -		2,583,685

At the value (*then*) of 1*s.* 9$\frac{3}{5}$*d.* per scudo,
= 232,531*l.* 13*s.* sterling.

Correctly extracted from the Records
in the Audit Office.

(Signed) Wm. Hy. Thornton,
Malta, 17*th Feb.* 1853. *Auditor-General.*

Mr. Thornton informs me that "in 1813, when the plague broke out, the local revenues were in the most flourishing state; up to 1809 they were aided by large subsidies from Great Britain, but from that time, the commercial prosperity of the island having increased, the Civil Government managed to meet its expenses with its own resources, until the cessation of commercial operations, which were driven elsewhere by the epidemic, precisely at the time when the disasters of the French armies threw other ports open to trade. The revenues of the year 1812 amounted to between 130,000*l.* to 140,000*l.*, a large sum, considering that there was then no corn monopoly of Government, although in the present open trade the consumption duty on wheat has now become the chief source of the island revenues. The deficiency of funds in 1813 was supplied by a subsidy of 172,750*l.* from the military chest, whereof 16,875*l.* was repaid

in 1816, leaving 155,875*l.* as the expense which the epidemic occasioned to Great Britain in aid of the Civil Government of Malta, besides the extra amount incurred for the service of the garrison."

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For Her Majesty's Stationery Office.

REPORT

ON THE

LAWS AND ORDONNANCES IN FORCE IN FRANCE

FOR THE

REGULATION OF NOXIOUS TRADES AND OCCUPATIONS;

BY

DR. WALLER LEWIS,

MEDICAL OFFICER TO THE GENERAL POST OFFICE.

REFORM

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

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FOR HER MAJESTY'S STATIONERY OFFICE.

1855.

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PREFACE.

General Post Office, St. Martin's-le-Grand,
July 1855.

Sir,

In compliance with the instructions of Viscount Palmerston that I would make a concise digest of the laws and ordonnances in force in France for the better regulation of noxious trades and occupations, I have the honour of transmitting herewith the following series of reports:—

The works that I have more especially consulted are, the "Collection Officielle des Ordonnances de Police," drawn up by M. Gabriel Delessert, formerly Prefect of Police; the "Annales d'Hygiène," the "Traité d'Hygiène Publique et Privée," by Dr. Michel Lévy; the Dictionnaire d'Hygiène Publique," by Dr. Ambroise Tardieu; the "Dictionnaire des Altérations et Falsifications des Substances Alimentaires," by A. Chevallier; together with numerous Reports of various Provincial Councils of Health, and other works, of which copies were transmitted by the French Minister for Foreign Affairs to the Earl of Clarendon, for the use of the late General Board of Health.

The same instructions having authorized me to visit Paris to observe the practical operation of the laws in question, I have done so, and have given the results of my observations in various reports.

I would beg to observe that through the kind offices of M. Billault, the Minister of the Interior, and of M. Collet-Meygret, the Directeur Général de Santé Publique, I was enabled to inspect all the public and private industrial establishments that the time at my disposal admitted of.

Many of these are models of what such manufactories should be, more particularly the White Lead Manufactory of M. Besançon and the Tannery of M. Leven, which leave nothing to be desired as regards the health and comfort of the workmen.

New and improved processes have been introduced in these and other factories, which supersede many of the old, objectionable, and unhealthy methods still all but universally employed in this country. The absolute disuse of the fermented dung of certain animals to de-lime the hides in tanning, is one among various instances that I might adduce in proof of this.

As far as I have been able to form an opinion, the system of keeping an active supervision by means of a department of the Police (Hygiène Publique et Salubrité) over the noxious trades and occupations likely to interfere with the public health, appears to be very successful. While the interest of the workman is strictly cared for, the masters themselves do not complain of any undue or harsh interference by the authorities.

To M. Trebuchet, the very intelligent chief of this service, who is the author of many of the most enlightened ordonnances that the French Government has promulgated, I am much indebted for his assistance.

I have the honour to remain,

Sir,

Your most obedient Servant,

Waller Lewis,

Medical Officer to the Post Office.

Sir George Grey, Bart.,
Secretary of State, Home Department.

REPORTS.

On the classification of unwholesome occupations, and the causes of their being so classed.

Industrial establishments are frequently inconvenient or unhealthy to the neighbourhood; the odours they give off, the vapours or the smoke they emit, may render the surrounding space, within a certain radius, very disagreeable, or even unfit for habitation.

The administration, therefore, has thought it necessary to take measures for satisfying the legitimate complaints generally given rise to by such establishments as fix themselves in the midst or on the borders of centres of population.

Nevertheless, it is but a few years since any precise and protective legislation has existed on this subject. It is true that from the fifteenth century, namely in 1486, a royal proclamation ordered the suppression of potteries in Paris, on the complaint of the neighbourhood; and in 1567, certain industrial employments, as those of chiffoniers, knackers, and tanners, were driven from the interiors of large towns. Still, up to the commencement of the present century, such establishments were the objects of no special regulations.

However, by an ordonnance of the 12th February 1806, the prefect of police prohibited the establishment in Paris of any workshop, manufactory, or laboratory which could compromise health or occasion a fire, without there being previously made, at the prefecture of police, a statement of the nature of the materials intended to be prepared, and the works proposed to be carried on. These declarations were to be followed by visits and inquests *de commodo et incommodo.*

But these regulations were badly carried into execution. The Minister of the Interior therefore consulted the Academy of Sciences on the general measures necessary for the regulation of manufactures in the interest of public health. The report of Guyton, Morveau, Chaptal, and G. Cuvier, served as the basis of the decree of 15th October 1810, and of the ordonnance of the 14th January 1815, which two regulate all these subjects at the present day.

All dangerous, insalubrious, or inconvenient establishments are divided into three classes, and before they are permitted to be carried on, certain authorizations and formalities are indispensable. Councils of Health are at the present time called upon to give their advice on the formation of such establishments as are classed.

Factories in the First Class.

The establishments of the *first class* are those that must be kept at a distance from private habitations; but it is not necessary that they be prohibited from the outskirts of a town. To the authorities belong the duty of examining if the isolation is sufficient, having regard to the importance of the works, to the nature and configuration of the soil, and to the importance of the surrounding dwellings. The demand for authority (*i. e.* for permission to establish) must be addressed to the prefect of the department, and to the prefect of police for the jurisdiction of the prefecture of the Seine. The demand must be accompanied by two plans, one indicating the connexions of the proposed works with the neighbouring lands and habitations, the other showing its internal arrangements. The demand for authority is placarded in all the communes within a radius of five kilometres (three miles), and must remain exposed during one entire month. Besides this, the mayor of the commune where the works are to be erected must hold an inquiry (une enquête) *de commodo et incommodo* among the nearest neighbours. This inquiry, drawn up by the mayors, consists of evidence gathered by themselves personally, or communicated by those interested in the matter; it constitutes one of the most important formalities preceding the authorization.

All the documents are transmitted to the prefect, who submits them to the Council of Health, and afterwards to the Council of Prefecture, if there is any opposition. When these various formalities have been gone through, the prefect sends the whole of the documents to the Minister of Commerce, with his recommendations, whatever they may be; when, after submitting the proposal to the advice of the Council of State, the minister proposes to the chief of the Government an order of refusal or authorization, which the prefect is charged with executing.

Factories in the Second Class.

The establishments of the *second class* are those which do not rigorously require their being kept at a distance from habitations, but which it is important not to allow until assurance has been obtained that the operations proposed to be carried on in them are executed so as not to be a nuisance to the neighbourhood, and not to cause damage. It is the prefects, who, after consultation with the Councils of Health, authorize the establishments of the second class.

Factories in the Third Class.

The *third class* works are such as may remain without inconvenience near dwellings, but which should be subject to the surveillance of the police. These establishments are authorized by the sub-prefects in the arrondissements of the sub-prefectures, by the prefects in the arrondissements of the departments, and by the prefect of police in his department.

These regulations have no retro-active effect. All the establishments in existence at the time of the promulgation thereof have continued being freely carried on, and may even be disposed of without the purchaser being called upon to obtain a new authorization, unless they are removed to another locality, or unless their proprietors wish to make some change in the conditions under which they were originally licensed.

The prefects have authority to suspend the formation of *new establishments*, *i. e.* such as proposing to deal with employments as yet unknown, have not yet been comprised in any class.

The following lists comprehend the most important establishments classed from 1810 up to the present time.

First Class.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Abattoirs, *public* and *communal*, for all towns.	Bad odour.
Acid, nitric. - - - -	Much smoke, and acid fumes.
Acid, pyroligneous (when the gases are given off in the atmosphere without being consumed).	Ditto.
Acid, sulphuric. - - -	Fumes disagreeable, unhealthy, and hurtful to vegetation.
Refining of gold or silver by sulphuric acid, when the disengaged gases are liberated.	Insalubrious gases.
Refinement of metals by means of the cupel or reverberating furnace.	Smoke and noxious vapours, also injurious to vegetation.
Matches, manufacture of, prepared with detonating or fulminating materials. This comprises chemical matches.	The same dangers as fulminating powders.
Starch, manufactures of, except such as is made without fermentation, and are provided with free means of escape for the waters.	Very disagreeable odours.
Resin. - - - - -	Danger of fire, and disagreeable odours.
Artificial fire, manufactures of. - -	Danger of fire, and explosions.
Prussian blue, manufacture of, when the smoke and gases are not consumed.	Odour unhealthy and disagreeable.
Prussian blue (depôts of blood of animals intended for the fabrication of).	Disagreeable smell, particularly when the blood preserved is not in a dried state.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Mud and filth, accumulations of. -	Odour very disagreeable and unwholesome.
Gut-spinning. - - -	Ditto.
Calcination of bones, when the smoke is not consumed.	Very disagreeable smell of burnt animal matter, carried a great distance.
Pearl ashes, manufacture of, when the smoke is unconsumed.	Disagreeable odour.
Animal débris (depôts of, and where animal matter is prepared by maceration, or dried for other manufactures).	Ditto.
Hemp, manufacture of. - -	Very unwholesome exhalations.
Animal charcoal, when the smoke is unconsumed.	Disagreeable odours of burnt animal matter, conveyed to a great distance.
Coke and charcoal, manufacture of. -	Smoke and disagreeable odours.
Chloride of lime, wholesale manufacture of.	Disagreeable odours.
Alkaline chlorides. - - -	Ditto.
Glue, manufacture of. - -	Ditto.
Combustion of sea plants. - -	Ditto, carried to a long distance, and injurious to vegetable life.
Strings for instruments, manufacture of.	Not disagreeable, if freely provided for the easy conveyance away of the waste waters.
Cotton cloth, manufacture of. - -	Bad smells, and danger of fire.
Crystal, manufacture of. - - -	Smoke, and danger of fire.
Varnished leather, manufacture of. -	Bad smells, and danger of fire.
Enamel, manufacture of. - - -	Smoke.
Printers' ink, manufacture of. - -	Very disagreeable smells, and danger of fire.
Manure, depôts and manufacture of. -	Disagreeable and unwholesome odours.
Knackers' establishments. - - -	Very disagreeable smells.
Ether, manufacture of, and depôts of ether, when they contain more than five gallons.	Explosion, and danger of fire.
Fusees, manufacture of. - - -	Explosion and fire.
Hat varnish, manufacture of. - -	Fire, and disagreeable odours.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Furnaces, large.	Thick smoke, and danger of fire.
Fulminating mercury and similar powders.	Explosion, and danger of fire.
Pitch, manufacture of.	Very bad smells, and danger of fire.
Fat melting over open fires.	Ditto.
Linseed oil, boiling of.	Ditto.
Oil of ox feet, manufacture of.	Bad odour.
Fish oil, manufacture of.	Ditto, and danger of fire.
Oil of turpentine, distillation of.	Ditto.
Litharge, manufacture of.	Dangerous exhalations.
Menageries.	Danger from the animals escaping from the cages.
Animal black, manufacture and depôts of.	Very disagreeable and unwholesome effluvia.
Ivory black, manufacture of, when the smoke is unconsumed.	Disagreeable odours carried to a great distance.
Archil, manufacture of.	Disagreeable smells.
Piggeries.	Disagreeable effluvia and noises.
Poudrette (artificial manure).	Bad smells.
Prussian red, manufacture of, in open vessels.	Emanations disagreeable and injurious to vegetation, when made with sulphate of iron.
Sal ammoniac, manufacture of.	Disagreeable smells.
Sulphur, flowers of, manufacture of.	Great danger of fire, and disagreeable odours.
Sulphur, distillation of.	Ditto.
Tallow melting.	Bad odours; danger of fire.
Sulphate of ammonia, manufacture of, from animal matter.	Disagreeable smells carried to a distance.
Sulphate of copper, manufacture of, by means of sulphur and wirework.	Exhalations disagreeable and injurious to vegetation.
Sulphate of soda, manufacture of, in open vessels.	Ditto.
Metallic sulphates, roasting of, in the open air.	Ditto.
Tobacco, combustion of the veins of, in open air.	Disagreeable odour.
Oil-silk, manufacture of.	Danger of fire, and bad smells.
Turpentine, extraction of, in the large way.	Unwholesome smells, and danger of fire.
Oiled cloths, manufacture of.	Ditto.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Tripe dressing.	Bad smells, and good drainage required.
Slaughter-houses in towns with a population exceeding 10,000.	Danger of animals escaping, and bad smells.
Urates, manufacture of. - - -	Disagreeable odours.
Glass works. - - - - -	Great smoke, and danger of fire.

Establishments of Second Class.

Absinthe or Wormwood, distillery of.	Danger of fire.
Acid muriatic, manufacture of, in closed vessels.	Disagreeable smell, and inconvenient when the vessels leak.
Acid muriatic oxygenated. - -	Ditto.
Acid nitric, manufacture of, by the decomposition of saltpetre by means of sulphuric acid in Wolf's apparatus.	Ditto.
Acid, pyroligneous, manufacture of, when the gases are consumed.	Slight smoke, and empyreumatic odour.
Acid, pyroligneous, all the combinations of, with iron, lead, or soda.	Ditto.
Steel, manufacture of. - - -	Smoke, and danger of fire.
Refining of gold or silver by sulphuric acid, when the gases are condensed.	Very few inconveniences when the apparatus is in good condition.
Starch, manufacture of, when made without the substances undergoing fermentation.	Bad smells.
Bitumen, manufacture of. - - -	Danger of fire.
Asphalte, manufacture of. - - -	Ditto.
White of whale (spermaceti), refining	Slight inconveniences.
Bleaching of tissues of wool or silk by means of gas or sulphurous acid.	Disagreeable effluvia.
Bleaching of hemp, cotton, or linen by chlorine.	Ditto.
White lead, manufacture of. - -	Inconvenience only to the health of the workmen.
Prussian blue, manufacture of, when the smoke and hydrogen gases are consumed.	But few inconveniences when the apparatus is perfect, which, however, is rarely the case.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Bricks and tiles, manufacture of. -	A large quantity of smoke, given off on the kilns being first lighted.
Laundries. - - - - -	Effluvia disagreeable and unwholesome.
Calcination of bones when the smoke is consumed.	Always bad smells, even when the apparatus in the best order.
Caoutchouc. Where this is dissolved in turpentine to apply to tissues. (Provisionally.)	
Charcoal burning in the open air. -	Smells and smoke very disagreeable, and extending to a distance.
Candle making. - - -	Some danger of fire, slight smell.
Hats, manufacture of. - - -	Disagreeable odour, and black dust carried to a distance.
Animal charcoal, when the smoke is consumed.	Bad smell always present.
Lime pits. - - - - -	Much smoke.
Chlorine gas. - - - - -	Smell disagreeable and annoying.
Chloride of lime, when the manufacture is under 600 lbs. per day, at the most.	Ditto.
Alkaline chlorides, when these products are used in the establishments in which they are made.	Ditto, but the inconveniences rather less.
Chromate of potass, manufacture of. -	Disengagement of nitrous gas.
Sealing wax, manufacture of. - -	Some danger of fire.
Glue from rabbit skins, manufacture of.	Bad odour.
Fresh hides, depôts of. - - -	Odour disagreeable and noxious.
Copper, melting of. - - - -	Smoke, and noxious emanations.
Brandy, distilleries of. - -	Danger of fire.
Potteries. - - - -	Smoke.
Tarred felt, manufacture of. - -	Bad smells, and danger of fire.
Metal founders, wholesale. - -	Noxious vapours, especially when lead, zinc, copper, &c., are melted.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Forges, large.	Much smoke, and danger of fire.
Gold and silver lace, burning in a large way.	Bad smells.
Gas works and gasometers.	Odours noxious, smoke, and danger of fire and explosion.
Gin distilleries.	Danger of fire.
Herrings, salting.	Bad odours.
Oil of turpentine and other essential oils, depôts of.	Very great danger of fire, must be isolated from all dwelling-houses.
Purification of oils by sulphuric acid.	Danger of fire, and bad smells.
Bacon, places for smoking.	Bad odours, and smoke.
Washing and drying sponges, establishments for.	Bad odours, produced by the escaping waters.
Liqueurs, fabrication of.	Danger of fire.
Morocco leather, manufacture of.	Bad odours.
Machines and boilers at high pressure, of more than two atmospheres.	Smoke, and danger of fire and explosion.
Machines and boilers working at low pressure, consuming or not their own smoke.	Ditto.
Plaster mills.	Much noise when done by the dry system; there is injury to the health of the workmen, and slighter mischief even to the neighbourhood.
Flour mills in towns.	Noise and dust.
Black from soot, manufacture of.	Danger of fire.
Ivory black, manufacture of, where the smoke is consumed.	Smells bad.
Mineral black.	Bad odours.
Refining gold and silver by furnace.	Unwholesome vapours.
Archil, manufacture of, in closed vessels, only employing ammonia, no salts of urea.	Ditto.
Bone, bleachings for fans and buttons.	Few inconveniences.
Oxyde of zinc.	Much smoke and dust.
Paper, manufacture of.	Danger of fire.
Parchment, manufacture of.	Disagreeable odour.
Phosphorus, manufacture of.	Danger of fire.
Smoking pipes, manufacture of.	Smoke.
Porcelain, manufacture of.	Ditto.
Prussian red, manufacture of, in closed vessels.	Slight noxious vapours, and smoke.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Salting fish, workshops for.	Very disagreeable odours.
Salt fish, depôts of.	Disagreeable odour.
Dried cod, depôts of.	Ditto.
Sulphur, fusion of.	Great danger of fire, and bad smell.
Sugar, refineries of.	Smoke, and bad odours.
Sugar, manufacture of.	Ditto.
Tallow, melting of, in water bath.	Some danger of fire.
Sulphate of soda, manufacture of, in closed vessels.	Slight odour, and smoke.
Sulphate of iron and zinc, fabrication of, with sulphuric acid and the metals.	Odour slightly disagreeable.
Metallic sulphurets, roasting of.	Ditto.
Tobacco, manufacture of.	Odour very disagreeable.
Tanning.	Bad odours.
Bleaching by oxygenated muriatic acid.	Ditto.

Establishments of Third Class.

Acetate of lead, manufacture of.	Inconveniences chiefly to the health of the artisans.
Acetic acid, manufacture of.	Few inconveniences.
Tartaric acid, manufacture of.	Slight odours.
Ammonia, manufacture of, wholesale, and the salts of ammonia.	Disagreeable odours.
Artificial slates and mastics of various kinds, manufacture of.	Ditto, and danger of fire.
Whalebone, working of	Noise, and fœtid odour, noxious and disagreeable.
Beating wool or hair constantly in large quantities.	Ditto.
Gold and silver beaters.	Noise.
Bleaching hemp, linen, or cotton, by alkaline chlorides.	Slight inconveniences.
Spanish white, manufacture of.	Ditto.
Artificial borax, manufacture of.	Ditto.
Borax, refining.	Ditto.
Candles from spermaceti.	Danger of fire.
Metallic buttons, manufacture of.	Noise.
Breweries.	Much smoke, and a little smell.
Brick kilns, with only one furnace in the open air.	Much smoke at the commencement.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Phosphoric matches. - - -	Danger of fire.
Laundries. - - - -	Soap and water decompose.
Camphor, preparation and refinement of.	Strong odours, and danger of fire.
Type founding. - - -	Slight inconvenience.
Burnt sugar, manufacture of, wholesale (caramel).	Danger of fire, and bad smell.
Cinder washing. - - -	Slight inconvenience.
Chicory, manufacture of. - -	Ditto.
Firewood, wharfs or yards of, in towns.	Danger of fire, requiring the surveillance of police.
Charcoal, depôts of, in towns. -	Ditto.
Limekilns, only working one month in the year.	Great smoke.
Chromate of lead, manufacture of. -	Slight inconvenience.
Wax melting. - - -	Danger of fire.
Horn, shaving of. - - -	Slight bad smells.
Dyers. - - -	Ditto.
Gilding on metals. - - -	Danger to the health of of workmen.
Writing ink, manufacture of. - -	Slight inconvenience.
Fattening cattle, large establishments for.	Bad odours and inconveniences.
Tinfoil, manufacture of. - -	Slight inconvenience.
Potatoe starch, manufacture of. -	Bad odours from the waters when they are kept.
Tin plate, manufacture of. - -	Slight inconvenience.
Melters by means of crucible. -	Slight smoke.
Cheese, depôts of. - - -	Very bad odours.
Hydrogen gas, small apparatus for making.	Smells, danger of explosion and fire.
Gasometers, not attached to gas works, and holding above 10 cubic metres.	Ditto.
Gelatine from bones, manufacture of, by acids and boiling.	Smells bad, when the materials are not fresh.
Looking-glass makers. - -	Dangers for the workmen only.
Lake colours, manufacture of.	Slight.
Wool washing, establishments for. -	Should be placed on banks of river or running stream.
Glazing skins. - - - -	Slight.
Oil mills. - - - -	Odour, and danger of fire.
Yellow ochre, calcination of. - -	Some smoke.
Papers, painted and marble, manufacture of.	Danger of fire.

Description of the unwholesome, dangerous, or inconvenient Establishments.	Summary of their inconveniences.
Shot factories. - - -	Slight.
Plumbers, and makers of fountains. -	Ditto.
Potass, manufacture of. - -	Ditto.
Sabots, establishments for smoking. -	Smoke.
Saltpetre, manufacture of. - -	Smoke and fire.
Soap boiling. - - - -	Bad smells, smoke, and disagreeables.
Salt refining. - - - -	Slight.
Dry subcarbonate of soda, manufacture of.	Slight smoke.
Soda, manufacture of, by decomposition of the sulphate.	Smoke.
Sulphate of copper, by means of sulphuric acid, and oxide or carbonate of copper.	Slight.
Sulphate of potass, refining. - -	Ditto.
Sulphate of iron and alum. - -	Smoke and smells.
Tartar, refining. - - -	Slight.
Wire-drawing. - - -	Noise and fire.
Slaughter-houses in communes containing fewer than 10,000 inhabitants.	Bad smells.
Cow-keepers in towns with more than 5,000 souls.	Ditto.
Verdigris, manufacture of. - -	Slight.
Meat, preserving. - - -	Ditto.
Vinegar, manufacture of. - -	Ditto.

On the effects on health of various Professions and Occupations.

The professions, if we except those called "liberal," are recruited almost invariably from among the middling and lower classes. It follows, that the influence of many occupations is engraved in permanent characters on the organization of certain classes of society, and gives rise to hereditary modifications, which combine with those of race, climate, &c. Such is the predominance of the nervous system among persons devoted to literary pursuits; the disposition to pulmonary consumption transmitted to their children by parents whom their occupations expose to this disease. Thus M. Lombard, of Genoa, has found that in a thousand deaths, consumption had furnished the following proportions:—

Occupations—

With vegetable and mineral emanations -	176
With various dusts - - - - -	145
With sedentary life - - - - -	140

Occupations—*continued.*

With workshop life	138
With hot and dry air	127
With stooping posture	122
With sudden movements of arms	116
With muscular exercise and active life	89
With exercise of the voice	75
Living in the open air	73
With animal emanations	60
With watery vapour	53

In manufactures, the majority of workmen are affected with scrofula; this scourge marks the children, the youths with its scars, its swellings, its infirmities, its hideous deformities; it attacks more especially the weavers and their families.

The populations of the manufacturing towns are weak and diminutive; bent over their looms and living in shade, they become etiolated like plants. Since the great increase of the manufactures in the department of the Haut-Rhin (from 1810 to 1823), the average height of the people has not increased in the same proportion as in the neighbouring departments. Official documents prove that the population of the manufacturing towns is less vigorous than that of the rural districts. Everything tends to exhaust it; placed as auxiliaries by the side of the devouring activity of steam or a fall of water which never reposes, it carries to its utmost limits the development of its forces; in the large assemblages of all ages and sexes, the passions are lighted up, the contagion of vice acts with a kind of furor, and the excesses of debauchery accelerate the deterioration of the strongest constitutions. In this manner the sources of reproduction become impoverished and corrupt: conceived in misery and libertinage, the weak scions of this bastardised population pass in their turns under the empire of the same causes of physical and moral degradation: it is in fact a circle without end, in which health and life go on exhausting themselves continually.

Sexes.

The comparative weakness of women exposes them to more dangers in the works they execute in common with men, and renders them more liable to the attacks of the noxious effects of each calling; they furnish, indeed, in the occupations exercised by the two sexes more diseases and more maladies than the males. This result is partly due to the difference of their earnings, which are less than those of the men, because they have less strength to spend. Up to the age of 15 or 16 the wages differ little for the two sexes; but from that time, the earnings of the women are much inferior to those of the men, and after the age of twenty, the woman obtains in general but half the amount that the man does. Now the salary is the nourishment, the clothing, the lodging; the workwoman is therefore ill fed, ill clothed, ill lodged; she languishes in narrow circumstances, often in misery, which finishes the destruction of her constitution.

And as the deprivation of enjoyments does not extinguish the taste or the desire for them, as want is a bad adviser, and quickly triumphs over the weak resistance of a conscience without religious light to guide it, first debauchery, then excesses of all kinds come in to consummate the work of destruction commenced by distress. Certain occupations have a more rapid decline to evil: needlewomen, dressmakers, embroideresses, modistes, &c., furnish always more of the class of public women than women employed in brushmaking, menders of old clothes, &c. The separation of the sexes in the workshops is a measure imperiously demanded for the moralisation of the working population.

Age.

On the 22d of March 1841 a law came into operation, of which the following are the principal provisions.

On account of the danger and insalubrity, children shall not be employed under the age of 16 years in certain establishments, to be determined by the Government. From 8 to 12 years of age, they shall not work more than 8 hours a day, these hours to be divided by a repose; from 12 to 16 years of age, 12 hours of work per day, divided by times of rest, and comprised between 5 a.m. and 8 p.m. In the works of urgency which take place during night, children can only be employed if they are above 12 years of age, and during 8 hours only in the 24.

Health.

The various employments divide themselves under this head into two classes, depending upon whether they are carried on in the open air, or in confined air. Consumption is twice as frequent in the first case as in the second. The latter group comprises professions carried on in vast spaces well aerated, others which confine the workmen in narrow close localities. M. Lombard finds phthisis in a larger proportion among the latter than among the former. Thus the workshop well closed, where are arranged a certain number of workmen; the schools where studious youths are congregated; the closet where the professor passes long hours in meditation, act all in a similar manner; all these temporary habitations sin by their dimensions, by the non-renewing of the air, by the elevation of the temperature, and the hygrometric saturation of the atmosphere, &c. In a great number of occupations the atmosphere is loaded with vapours or dusts, which exert a direct action on the lung, and may give rise to general phenomena. The matters in solution in the air are purely aqueous, animal, vegetable, or mineral; they will be discussed farther on.

As to the dusts, independently of the specific effects they produce by their nature, they exercise a direct influence on the lung, which is in the ratio of the volume, the weight, and the consistence of their molecules.

The inhalation of coarse particles is less dangerous than that of dusts finely divided, which penetrate more easily into the last ramifications of the air cells. The researches of Messrs. Benoiston and Lombard have proved that sculptors, masons, plasterers, exca-

vators, hatters, brushmakers, harness-makers, mattress-makers, &c., furnish fewer consumptive patients than millers, wig-makers, paviors, sweepers of streets, charcoal-dealers, bakers, cutlers, chimney-sweeps, polishers, &c.

Dusts from hard substances cause a much greater number of consumptive cases than dusts from soft bodies, or of ordinary hardness. The specific gravity of the dusts does not affect in any marked manner the production of phthisis.

Under the consideration of their origin, mineral dusts are the most noxious to the lungs; then follow animal dusts, and lastly vegetable. The private habitations of workmen leave much to be desired; they live in narrow, dirty, obscure streets; too frequently only one room, encumbered with beds, tools, chairs, serves at the same time as workshop, kitchen, and bedroom. M. Villermé, however, observes that the habitations of the labouring classes are generally beginning to improve; one sees many that are healthily and conveniently constructed.

Generally those workmen, whose conduct and manners are blameable, live in the same streets and the same houses, in the most filthy and most unwholesome parts of the town, whilst the good and meritorious artisans seek different quarters, and make pecuniary sacrifices to establish their separation from the former class. The rendering healthy the habitations of the working-classes is one of the first requirements of public health; *it is the duty of those in authority to attempt it.* The commodious settling of working families would not be a fruitless enterprise; it would implant in them a love of home, a taste for domestic life; it would strengthen the ties of family, would inspire them with sentiments of forethought and economy by the possession of the first element of comfort.

Dress.

Labourers, although better dressed than formerly, have still much to desire and to do for their cleanliness, for their vestimentary protection; they do not change their linen sufficiently often; they keep on their bodies clothes impregnated with sweat, they put them on badly, or do not cover themselves completely; from thence arise a host of diseases that they attribute to the action of cold, without thinking that it is in their power to annul this cause by dressing more properly.

Smelters, blacksmiths, glass-blowers, furnace-heaters, stokers, bakers, &c., who are plunged in a burning atmosphere, take no precaution whatever on quitting their work; those who execute works requiring great strength, cool themselves with the same imprudence.

Greater care paid to the clothing, and its more fit appropriation to the wants of various professions, would reduce the number of severe diseases and the mortality thence ensuing.

Various Senses injured.

Certain employments fatigue particularly one or other of the senses. Those which are concerned with very shining materials,

as metals, looking-glasses, &c., injure the sight; it is of importance to interpose between the artificial light and the object worked at a piece of stretched canvas, an oiled paper, a gauge, or some other screen which intercepts the direct luminous rays, and will only permit a diffused light to pass.

The smallness of the objects, and the intensity of direct or reflected light, always end in compromising the integrity of the vision. Many astronomers, who have applied themselves to the observation of the sun, as Galileo, have become totally blind; opticians who daily examine and test spectacles and microscopes, engravers, watchmakers, compositors, &c., are threatened with amblyopia and amaurosis; night-work fatigues as much by the smallness of the print or the writing, as by the whiteness of the paper reflecting the light of the lamps; workwomen in linen, lace, &c., are forced by the same cause to have early recourse to the use of spectacles.

It is not exactly known whether the trades in which hammers are used, and the sojourn in workshops in which noisy engines ply, cause a weakening of the organ of hearing; but this appears to be very probable, according to the observation of Percy on the effect of detonations of artillery, which causes many gunners to experience rupture of the tympanum.

Extracts from the Ordonnances concerning Public Abattoirs in Paris.

(Condensed from the French Laws and Ordonnances de Police, from 1800 to 1850.)

ABATTOIRS.—Slaughter-houses.

BY a decree made by Napoleon I., dated February 9th, 1810, it was determined to erect five abattoirs at the expense of the city of Paris, as the following extract from the *Moniteur* of February 10th shows:—

"A decree of February 9th, 1810, made by His Majesty, in His "Palace of the Tuileries, contains the following provisions:—

"'There shall be established five abattoirs at Paris, three on the "'right bank of the river, one of which shall contain 24 slaughter-"'houses, the second 18, and the third 12. The two abattoirs on "'the left bank shall each contain 18 slaughter-houses.'"

This plan was subsequently very much altered and extended.

The following table gives a summary of the relative sizes and capacities of each of the five abattoirs:—

Name of Abattoir.	Acres.	No. and Area of Slaughter-houses.
		sq. yds.
Montmartre - - -	$8\frac{3}{4}$	64 - - 3,872
Grenelle - - - -	$7\frac{3}{4}$	48 - - 2,904
Du Roule - - -	$5\frac{3}{4}$	32 - - 1,936
Menilmontant - - -	$10\frac{1}{4}$	64 - - 3,872
Villejuif - - - -	$5\frac{1}{2}$	32 - - 1,936

Each of these is about $1\frac{3}{4}$ miles from the centre of the city, but within the barriers, as the small plan attached will show.

These five abattoirs were completed in the year 1818.

The following are the principal clauses relating to the public health:—

7. The inspector of police will attest the fact of the *natural* death of any beast in the abattoirs. The inspectors of the butchers will send the animals so dying to the menagerie, as well as all other meats (in whatever place they are found) that they consider unfit for human consumption.

48. All the animals intended for the butchers' trade of Paris, without exception, can only be slaughtered and dressed in one of the five public abattoirs.

52. The butchers must provide themselves with gambrels, blocks, tubs, buckets, wheel-barrows, and all other necessary tools and instruments, which they must keep clean and in good condition.

64. Admission into the oxen sheds during the night with lights is prohibited, unless they are covered.

67. Butchers may kill at any hour of the day or night.

68. Butchers who slaughter at night are ordered to declare the same to the superintendent of police.

69. It is strictly prohibited to leave the doors open during the slaughtering.

70. The butchers are enjoined to cause their scalding-houses to be washed after killing.

71. They are prohibited from leaving in the scalding-houses any tallow, grease, dung, intestines, or skins of any kind.

72. The butchers must remove the dung from the oxen's stalls every month, or as frequently as requested by the police, and the liquids every day.

73. Accumulations of hair and skulls are prohibited.

75. No slaughtering of oxen, cows, or calves is permitted in the courtyards or paved yards.

76. The oxen and cows, before being killed, must be securely fastened to a ring in the wall of each slaughtering room.

The butchers are responsible for any accident arising from neglect of this article.

77. The bullocks and oxen known to be dangerous must be driven to the abattoirs and scalding-rooms in chains, or coupled together. together.

78. The calves and sheep must be bled in tubs, so that the blood shall not find its way into the channels which lead to the drains.

79. The butchers to cause the walls, floors, and doors of the scalding-houses to be frequently scraped and washed.

80. They must not deposit the skins and hides of the beasts in the streets or paved yards.

92. The persons employed in removing the blood must remain in the work yard during the killing.

93. They are prohibited from encumbering the passages and paddocks with their casks, either full or empty. They must place them where directed by the police.

94. Every day, after work, they must roll the casks full into the appointed places.

These must not remain in the abattoirs more than 24 hours.

95. The contractors for the liquids must remove them completely each day and hour prescribed.

96. The fats resulting from the slaughtering can be melted at no other place than the abattoirs.

132. The entrails of all the animals slaughtered in each abattoir to be dressed and prepared in the tripe establishment of each abattoir before they are removed.

Those entrails that are intended for the exterior of Paris are excepted.

141. Butchers, melters, and tripe-boilers, to employ only covered vehicles for the carriage of their goods.

155. Any butcher's boy selling calves found in the inside of cows that he has killed, and who does not immediately declare the fact to the superintendent of police, in order that these unwholesome meats may be cut in pieces, to be thrown into the common receptacle, shall be tried and punished according to law.

261. The larger entrails only to be sold after having undergone certain preparations.

These dressings only to be made in the tripe establishments of the abattoirs.

The butchers and their assistants to transfer these parts forthwith to the tripe preparers.

262. The tripe-dressers to remove these parts from the boiling-houses to the drying-houses immediately.

Remarks and observations on the Public Abattoir system of Paris, with explanatory remarks.

THE abattoirs, intended at first only to receive oxen, bulls, cows, calves, and sheep, required to be rendered complete by adding similar conveniences for pigs, and, at the present time, piggeries are almost everywhere united to the abattoirs for other cattle. Nevertheless, although by Article 2 of the ordonnance of April 15, 1838, the establishment of public abattoirs for pigs, suppresses the private killing of these animals, the authorities have thought it right to permit private individuals to kill pigs intended for their own family use, in closed places away from public paths.

In addition to the buildings used for the lodging of the persons employed, the abattoirs of Paris are composed of four parts entirely distinct:—

1st. That where the animals about to be slaughtered are kept.

2d. The abattoir proper, with all its accessories.

3d. The places where are prepared the entrails of the slaughtered animals.

4th. Lastly, those places where they prepare the tallow and fat.

There is nothing particular to remark on the places of reception for the oxen, sheep, and pigs, where are taken directly all the animals coming from the markets, except that they must be suffi-

ciently spacious, very airy and kept clean, particularly the piggeries, which must be cleansed every day.

The *abattoir proper*, commonly known under the name of *échaudoir* (boiling house), is built round one or more work yards completely paved, with gentle side slopes which conduct to a draft hole in the centre all liquids which run from the échaudoirs and from the yards themselves; a tap opened at each corner facilitates the cleansing. The buildings are divided into a certain number of workshops called "cases d'abat," paved and provided with a tap for washing, a hollow trough made in the pavement to receive the blood, a system of windlasses and pullies to raise the body of the animal, of two frames on which are placed the rollers for suspending the quarters of beef, and long iron bolts or hooks for calves and sheep. The roofs of the échaudoirs project several yards, so as to protect the interior from the rays of the sun and to keep up a continual coolness. This coolness, according to M. Parent Duchâtelet, confirmed by the observations of Hugard, the elder, in Alsatia and Switzerland, is necessary, not only for the preservation of the meat in summer, but also for preventing the flies from attacking it. "There is neither canvass nor metallic gauze which can compare in this respect with a temperature lower by some few degrees than the surrounding atmosphere." An indispensable addition to the échaudoir is a court for the liquids. Into this are run all matters derived from the intestines, and all the filth of the abattoirs. These yards, known under the names of *voiries* or *coches*, and provided with the means of washing found necessary, are placed above a large drain, and cleaned out every night. In the pig abattoir, there are in addition burners or boilers, according as an open fire or boiling water are made use of to skin the pigs, and hangers where the dressing takes place.

Certain parts of the slaughtered animals, known under the name of "issues," and intended for the tripe trade, must undergo, *before being removed* from the establishment, particular preparations. From thence results the necessity of workshops perfectly isolated, some of which are reserved for washing and cooking the stomachs of oxen, cows, and sheep, and the preparation of sheeps' toes from which the wool and claws have been removed; and some serve for the preparation of calves' heads and feet, and for cooking sheeps' heads, or for washing, scraping, and dressing the intestines of pigs. It is right that these buildings, built of hewn stone, and consisting of one storey only, should have their summits constructed of a framework of iron covered with zinc.

The ordonnances of police do not permit in Paris the melting of tallow "en branche," by which is understood all the fatty parts of the animals, in any other place than the public abattoirs. The advantages of this regulation, as regards public convenience, cannot recompense for the grave inconveniences that are caused by it to the abattoirs. The melting takes place in stoves of not less capacity than 1,000 kilo-grammes. On account of the danger of fire from this operation, and which contributes to add to the opinion that the melting should be removed from the abattoirs, all lights must be kept in closed lanterns, and with a metallic gauze.

Water Supply.

Such are the different parts which compose an abattoir; but there is a condition essential to the salubrity of these establishments, viz., the water supply. "Before constructing an abattoir," says Parent Duchâtelet, "we must be especially careful about two circumstances of the highest importance:—

1. The means of having abundance of water.
2. The means of carrying it off again."

This two-fold consideration must govern the choice of localities for an abattoir. Wells, steam-engines, or mills, and reservoirs will serve to bring and hold the water. Not less than 20,000 gallons are required for the daily use of one of the Paris abattoirs, and at Rouen about 8,000 gallons. This water is not only made use of to wash the workshops and court-yards, in which places it should be continually flowing, but it is employed in the preparation and cooking of the entrails of the cattle, &c. It is also necessary that the water employed in the cooking of tripe shall have undergone no alteration, and that it is pure and well filtered. The Council of Health of Nantes has well pointed out the importance of this. As regards the water for washing, and especially the cooking waters, in which 300 or 400 stomachs have been successively boiled, the rapidity with which these putrify, and the noxious odours they exhale, require that an easy and unobstructed flow be secured for the waters which leave the abattoirs. There are different ways of effecting this end. The usual mode consists in special drains which lead either directly to the river or into other sewers, the fall of which should be at least one in fifty. At Rouen, where the abattoir is the model of cleanliness, the waters used for washing run into immense subterranean aqueducts, which meander through the entire abattoir, and conduct the waters to the lowest and most distant part of the establishment.

But whatever care is taken, the drains of the abattoirs which receive the remnants of animal matter, pieces of intestine, blood, &c., always give off a more or less fetid smell, and expose the men who clean them to greater dangers than the ordinary drains.

The cattle destined for food are conducted immediately to the abattoirs, where a special inspection is made by competent persons. It is prohibited to slaughter in these establishments any animals attacked with or suspected of being attacked with contagious diseases. The animals affected by other diseases cannot be slaughtered without the consent of the inspectors of the butchers, and in case of doubt, without the previous inspection of a veterinary surgeon. Animals dying accidentally in the abattoirs are subjected to the same provisions. Lastly, the meat itself must be inspected after the killing, and if found deteriorated, hurtful, or stinking, is seized.

Every public and communal abattoir, and the private abattoir of every town whose population exceeds 10,000, are ranged in the first class of unwholesome establishments, while the private abattoirs of towns, with a smaller population than 10,000, are placed only in the third class.

On the Practical Working of the Abattoirs of Paris.

To the Right Hon. Sir GEORGE GREY, Bart.

11, Hanover Terrace, Regent's Park,
May 1855.

SIR,

IN compliance with the instructions contained in Mr. Waddington's letter to me of the date of the 8th November 1854, to the intent that, if I considered it necessary to visit Paris to observe the practical working of the French laws for regulating unwholesome trades and occupations, I was authorized to do so, I beg to state that having visited the French capital for this purpose, I had every facility afforded me by M. Billault, the Minister of the Interior.

I have the honor of submitting the following observations on the practical working of the abattoirs in the neighbourhood of Paris.

I visited those of Montmartre, La Villette, and Menilmontant or Popincourt.

The abattoir of Montmartre, where, I understand, more beasts are slaughtered than in the whole of the four other abattoirs together, is considerably too small. It is also built too close to the contiguous houses, not being farther than fifteen metres from the adjacent tenements, the inhabitants of which complain loudly and repeatedly of the noxious odours emanating therefrom.

These odours are principally from the operations connected with the process of melting tallow. This is done in two modes: the old one consists in melting down the fat of the animals in a large copper holding nearly eight hundredweights, and placed over the open fire. The new process consists in placing the fat mixed with a certain proportion of water and a fiftieth part of the same amount of sulphuric acid in an air-tight closed copper, heated by steam. It is the former old method alone which appears to cause the very sickly disagreeable odour so much complained of.

The newly improved acid process is quite free from this disadvantage, and as I am informed, is about to be enforced in all cases in the Paris abattoirs. The tallow formed by the two processes varies in appearance, and to a certain extent in quality.

It appears that for all purposes of candle making, the one is as serviceable and makes as good candles as the other; but for the purposes of leather making, the tallow formed by the acid process does not answer so well as the other. I presume this to arise from the tallow in this case containing a small quantity of the sulphuric acid in combination with it.

This latter species of tallow is whiter and rather firmer than the open fire tallow.

The vapours given off by the old process attack the throats of the neighbours, causing a feeling of constriction and sickness. However, it does not appear that the workmen themselves, when they have once become habituated to these operations, experience any ill effects from them.

They are particularly healthy, being free from bowel complaints

and fever, and rarely or ever having attacks of cholera in seasons of epidemics. This is a fact that has constantly been given to me in evidence both in France and England, that workmen engaged in manufactories connected with dead animal matter are particularly free from disorders of this class.

All the bouveries or stables for the cattle, both of Montmartre and the other abattoirs, are far too low and close, and very deficient in means of ventilation. There is much ammonia given off, and the dung and manure are not changed sufficiently often —only once a month.

The semicircular windows are not nearly capacious enough.

The abattoirs, especially that of Montmartre, are far from being as clean as such places should be. The slaughtering courts are not well drained; the fluids do not find their way off the pavements sufficiently rapidly.

The courts themselves are too close and crowded; and from not being covered in with glass the workmen are exposed to rain during many consecutive hours in wet weather. They frequently suffer from cold and rheumatism.

In any abattoirs to be formed in this country, all the slaughtering courts should be at least ten feet wider than those of Montmartre; and the upper storeys of these, known by the name of "sechoirs," having been originally built for the purpose of drying the hides of the animals before they were sold, are quite useless for this purpose, which is not carried out. The sechoirs are now only employed as dressing rooms for the journeymen butchers.

Much of the meat that is brought alive to the abattoirs by railway is injured by the hind quarters of the cattle being bruised. This part of the meat becomes injected with blood and quickly putrefies, especially in the summer, and is seized by the inspectors as unfit for human food.

I have the honor to be,
Sir,
Your most obedient servant,
WALLER LEWIS.

Ordonnances concerning Knackers.

A POLICE Ordonnance was issued in the year 1811 (24th August 1811), by Baron Pasquier, which contained 15 articles.

It ordered that in 10 days from that date all knackers then in business must present their licences, and get them renewed under regulations which would only accord licences to those who were provided, or would provide themselves, with certain tools, utensils, &c.

The ordonnance of that date was subsequently altered and modified by the following, dated 15th September 1842.

1. All persons exercising or wishing to exercise the occupation of a knacker must declare the same at the Prefecture of Police.

He must declare what tools and utensils necessary for that commerce he is possessed of, and these must receive our approval.

2. The carts and vehicles for the transport of the animals must be so constructed as not to allow the escape of any liquids, or the contents of the carts to be seen.

These vehicles must, before being used, be submitted to the examination of our agents. They will then receive an official stamp.

Independently of the metallic plate with which they will be furnished, the knackers must cause to be painted on some visible part of the vehicle, in letters at least six centimetres in length, their name, business, and address.

3. The vehicle must always accompany a train of live animals.

4. No living or dead animals intended for the knacker must enter Paris.

5. No knackers' operations are allowed to be carried on in Paris. These operations are only to be performed in the suburban establishments erected for this purpose.

6. The dead animals removed from Paris, as well as the living animals intended for the knacker, can only be taken to the knacker's, from midnight to 6 A.M. in the summer, and to 8 A.M. in the winter.

7. Glandered horses, and all other animals attacked with contagious diseases, dead or living, must be taken forthwith to the knacker's without stopping on the road, under any pretence.

8. Knackers to remove, on demand by any one, immediately, animals dead on the public paths, or in any private place.

9. Infringers of the last article to be brought before the public tribunals.

10. The ordonnance of August 1811 is repealed.

11. This ordonnance to be executed by the police, &c.

(Signed) G. DELESSERT.

Ordonnance concerning the opening and police regulations of the Knackers' Abattoir established by the City of Paris at Aubervilliers.

CHAPTER I.

Regulations relative to the Knackers.

1. The abattoir to open 1st November 1841.

2. Knackers already authorized may carry on their business at Aubervilliers.

They are to address their demand to the Prefet de Police.

3. If their operations require the aid of machines, furnaces, &c., they must, previously to erecting such, receive the authority of the Prefet of the Seine.

4. Animals intended for slaughtering, once brought into the establishment, cannot leave it under any pretext.

5. When live animals pass a night in the abattoir, a truss of hay, weighing 10 lbs., must be given to each horse or mule, and half a truss to each donkey.

6. Each stall serving as stable shall be cleaned out every morning by the knacker; the dung must be removed.

No animal remains must be mixed with the dung.

7. Every dead animal, brought in during the day, shall be immediately cut up, without leaving the spot.

Every dead animal, brought in during the evening or night, shall be cut up the next day.

8. Each knacker only to cut up the number of animals that it is feasible to cut up in a day.

All the products of the day that the knacker wishes to make use of must be removed from the knacker's establishment before nightfall, to be taken to the authorized establishments.

9. Knackers not to leave in the workshops any animal substance not disinfected.

Moreover, no accumulation of tallow, fat, skinning, shaving of skins, and skins themselves, or hoofs.

10. No blood of animals to run elsewhere than in basins provided for that purpose.

11. The barrels brought to remove the blood not to encumber the courts, nor to be placed in the workshops.

The barrels, when filled, must be removed every day, and not to remain there twenty-four hours; they must be cleaned externally with disinfecting powder, or some other equally efficacious means, so as to leave no smell.

All instruments to be kept clean.

12. No vehicles for transporting dead animals to be allowed to remain in the court-yards.

The horses employed in the service not to remain, even for a moment, in the stalls intended for the animals to be killed.

13. No tools to be left in the yards, but to be kept in the workshops.

14. Every matter coming from the knackered animals must, within twenty-four hours from the slaughtering, be transformed into products not putrefactive, or into disinfected products, or else to be removed from the establishment in covered and well-closed carts, and with all possible sanitary precautions.

An inspector to view the carriages or carts on leaving the establishment.

15. The knackers who follow the plan of the concessionaire to finish the slaughtering of their animals at 4 P.M. in winter, and 5 P.M. in summer. They must not, under any pretext, open the steam-boilers when the steam has been introduced; they must wait till the steaming is completed.

16. The knackers may give up to the concessionaire, without being obliged to disinfect them, all the products and residue.

17. Knackers' boys, to be admitted, must be provided with a *livret*, to be kept in the office of the inspector of the abattoir.

18. The knacker and his assistants to be each provided with trousers and waistcoat for working in, which they must wear while at work, but must not leave the abattoir in.

19. Journeymen not to destroy or damage any article belonging to the abattoir.

The masters are responsible.

20. No writing, tracing, or drawing on the doors or walls allowed.

21. All kinds of games of chance or skill in the abattoir disallowed.

22. Assistants not to sleep in the workshops, stalls, or stables.

No chandeliers, candles, or hand-lamps to be used in the workshops, stalls, or stables.

Fires to be extinguished when finished with.

23. Journeymen or boys who misbehave may be dismissed by the inspector.

Chapter II.

Of the Concessionaire of the Abattoir.

24. The concessionaire to keep in good condition the water-conduits, so that there shall never be a want of water in the different workshops.

25. He is to provide coppers and steam to the men who work in the northern establishments.

These coppers to be kept constantly in good condition by him, and as numerous as they are required to be.

He is also to provide steam for those in the southern establishments who shall desire to be supplied by his method.

26. Concessionaire to clear out horse-boxes, court-yards, and workshops every night; to clean, wash, and deodorize every part of the abattoir, if required for health, twice a day.

27. The same with streets, &c. of the abattoir.

28. He is to keep the reservoirs constantly filled with water.

The water that has been used in the cutting up the animals to be thoroughly disinfected.

The drains to be kept clean and deodorized.

29. The liquids to be emptied daily.

30. The concessionaire to disinfect immediately all unwholesome animal matter brought to the abattoir.

31. All live or dead animals brought or sent to the abattoir, and abandoned to the concessionaire, to be cut up and disinfected forthwith.

32. The concessionaire to deliver to the prefect for his approval a scheme for the healthy carrying on of the processes of disinfection, &c.

Chapter III.

Tariff of the sums to be paid for cutting up, &c.

33. There shall be paid to the concessionaire by the knackers and other persons licensed by the Administration, with the exception of those after mentioned, the sums following:—

For Killing and Cutting up.

For each horse, dead or living, ox, or cow	3	francs.
„ mule, pig, or ass - - -	1½	„
„ small animal, dogs, cats, &c. -	10	cents.
For unwholesome meats - - -	2½	frs. per 200lbs.

For Cooking, Furnishing Steam, and for the Use of the Copper.

For each horse, ox, cow, calf, mule, or ass 1½ francs.
„ small animal, dog, cat, &c. - 10 cents.
For unwholesome meats - - - 2½ frs. per 200lbs.
Those who find their own steam to be exempt from these latter dues.

Tariff of location.

Annual rent for a single stall or workshop - - 500 francs.
„ „ double „ - - 1,000 „

34. No charges to be paid by persons sending or bringing objects to the abattoir and leaving them to the concessionaire, who is bound to accept them.

This rule applies to all objects sent by the police to the concessionaire.

35. The concessionaire must adopt the above tariff without increase.

Chapter IV.

Of the Theatre for judicial autopsy.

36. The knacker who has placed in the theatre the body of an animal, the cause of whose death is in dispute, shall, as soon as this has been settled, cut up the body and remove the different portions.

The concessionaire shall immediately clean the place.

37th. If the examiners charged with the *post-mortem* examination shall require that some portion of the body be kept, the concessionaire shall take all necessary precautions for health in so doing.

38. No other operations than those mentioned in Article 36 shall be carried on in the theatre without the authority of the prefect.

39. If such authority be given, it shall only be on those days when the theatre is not required for *post-mortem* examinations.

40. The concessionaire to keep the theatre clean at all times.

Chapter V.

Inspector of the Abattoir.

41. The abattoir and the workshops of the knackers are under the personal surveillance of an inspector, specially charged by this police with this duty.

42. The inspector to inhabit one of the lodges at the entrance of the abattoir.

43. He is to keep a register, where will be inscribed, day by day, distinguishing their species, the living and dead animals which are brought to the knackers.

44. He will supply to the Prefet de Police, weekly, a list of the animals killed and cut up.

45. If several animals of the same species shall have died within a short time of the same disease, giving cause to fear an

epizootic disease, the inspector will forthwith report the circumstances to the Prefet de Police.

46. He must not leave the establishment without our special permission.

47. If he has dismissed any journeyman for bad conduct in the abattoir, he is to send in to the Prefet a written account of the causes.

Chapter VI.

General regulations.

48. The trains of horses for slaughtering to be brought direct to the abattoir without stopping. They must traverse Paris only from midnight to 6 A.M. in summer, and from midnight to 8 A.M. in winter.

49. No strangers admitted without permission.

50. No animal, except those employed on the service or for slaughtering to enter the abattoir.

51. No pigs, rabbits, pigeons, poultry, goats, or sheep to be brought up in the abattoir.

52 to 55. Publication of this ordonnance.

(Signed) G. Delessert.

Description of the operations carried on, and the methods of preparation of the flesh and bones of horses and other animals slaughtered at or taken dead to the knackers' establishment at Aubervilliers, near Paris.

Some idea may be formed of the importance of properly constructed knackers' establishments in the neighbourhood of large towns, when it is considered that, during the last forty years, there have been slaughtered at Montfaucon more than 400,000 horses, and 1,500,000 cats and dogs.

The live horses may be slaughtered in several manners: either by injecting air into the veins, in dividing the spinal marrow, or by killing them like oxen, as is done at the abattoirs. At the present time, the following method is generally pursued: The animal is attached to a stake, and a knife plunged into the chest opens the veins and arteries. Large quantities of blood escape by the wound. At first motionless, the horse staggers, falls, and dies in a few minutes, without apparent suffering. The animal is then turned upon his back, his blood is carefully collected, and his skin removed as speedily as possible by the aid of extensive incisions. The tail is cut off at the root, the feet removed, afterwards the limbs; the fat is carefully put aside, and the flesh cut off in large masses. This done, all the dismembered parts of the animal are thrown into the water in a large and well closed boiler, and submitted to the action of fire. Twelve or fifteen hours are required for the complete boiling. In Paris the boiler is put to

work by means of steam. When the flesh is well cooked, it has lost a large portion of its grease and gelatine, and is easily detached from the bones, the tissue of which is become more brittle.

The boiler then contains a quantity of liquid, divided into three layers; the upper stratum is grease, which is removed with large spoons, the middle is gelatine dissolved in water, the lowermost is a mixture of blood and other organic matter.

Messrs. Salmon and Payer proposed, in 1833, the following process for the disinfection of dead horses, by means of steam pressure. The blood of these animals is collected with care, and after the skin and all the useful portions have been removed, the carcass, cut in pieces, is placed in a large iron case, together with the blood and entrails. This case, large enough to contain four horses, is placed in communication with a steam boiler worked at a high pressure. In an hour or two the flesh is completely detached from the bones, and converted into a kind of marmalade, which is afterwards submitted to hydraulic pressure.

The hair, skin, blood, muscular parts, entrails, tendons, fat, bones, even the shoes and nails, all may be utilized either for commerce or agriculture, or for the food of animals. The carcass of a horse may be made to yield from three to four pounds, or upwards.

M. Parent-Duchâtelet recommends the following as the principles to be kept in view by Boards of Health in erecting such establishments.

A surrounding wall shall encircle the building and yards, whose isolation is to be perfect. No habitation to be permitted within 150 metres; the wall to be of hewn stone, with a glazed surface; the blood to run upon an inclined plane, paved with stone or bitumen, and received in a barrel, immediately dried and mixed with the manure. All the gases and other emanations to be received in a tall chimney or flue, so as to convey them to a height in the atmosphere.

None of the operations connected with knackers to be carried on in the open air, with the exception of slaughtering. Cooking the flesh, the principal to be done in close vessels, and carried on by means of steam; afterwards the flesh, well pressed, dried, and pulverized, to be converted into manure. The slaughtered horse shall be cut up, submitted to all the operations of equarissage (the knackers), and removed from the abattoir within twenty-four hours. The yards must be perfectly paved with hard stones, cemented together with bitumen, and grooved with sloping channels for carrying off the waters and fluids. When loaded with organic matter, these waters would give off into the atmosphere noxious vapours, if exposed to the open air; they must, therefore, be received into cesspools, or conducted by covered channels into water-courses, if such there be within reach. Such waters as contain organic matter that cannot be otherwise utilized, shall be received into large parallel basins, and made into inodorous manure. All accumulations of fresh organic matter, bones, blood,

tendons, and skin, shall be strictly prohibited. In all large establishments of this kind, the slaughtering sheds should be provided with drying rooms open to the winds from every quarter, also with a sewer one metre in breadth by one and three-quarters in height, with a basin for receiving temporarily the organic matters, paved or covered with bitumen, in slope, and with the sides built of stone for a height of at least two metres.

The yards of knackers are ranged in the first class of unwholesome establishments.

However, there is no doubt at the present day, according to the observations of M. Parent-Duchâtelet, that the emanations from them are in no way detrimental to health, even to that of the children who are brought up or of the workmen who live in the immediate vicinity. The vegetation in the neighbourhood is a gainer by them. But the stench that these establishments give off, whatever precautions may be taken—the hideous spectacle they present—as well as the number of rats that always multiply there in an astonishing ratio,—every thing renders it impossible that any habitation should exist in their neighbourhood.

The Minister of Police having consulted M. Parent-Duchâtelet on this subject in 1832, was informed, among other things, that the police seized every year in the horse market, and sent to Montfaucon (the old knackers' establishment), 800 horses affected with farcy, glanders, or affected with black spots; that out of 250,000 horses reputed healthy, taken to Montfaucon during forty years, 144,000 proved to be labouring under contagious diseases. Nevertheless, although these animals have been killed, their skins mixed up together, their remains heaped together and spread on the soil, not only at Montfaucon itself, but also in the neighbourhood, there was no example of any case of glanders or smut being communicated to either man or animal employed in the establishment, or who had frequented it during many years.

On the practical working of the public slaughtering establishment for killing diseased or worn-out horses, cows, dogs, &c., at Aubervilliers, near Paris.

Operations carried on at the Abattoir of Aubervilliers.

1. The slaughtering of the larger animals, having only for object to separate the hair, hide, and feet, which are sold without undergoing any preparation; the animal is then cut up into pieces weighing from six to ten kilograms, which are placed in the large air-tight steam boilers, and boiled under great pressure.

2. The slaughtering of dogs, cats, sheep, &c., only the skins of which animals are taken off and sold after being dried. Their carcases are then placed whole in the boilers, with the larger animals.

3. The cooking takes place in large boilers, containing about three kilolitres each (3,000 quarts); these are made of sheet

iron, six or eight millimetres in thickness, having two doors each for the insertion of the flesh, and are provided with a double bottom, the upper one of which is bored with holes. The false bottom is placed half a metre above the true bottom at the level of the lower door, the upper door being fixed in the highest part of the side of the boiler.

The flesh must be so placed in the boiler that it does not form a solid compact mass, but that by means of the head, the bones of the limbs, and those of the pelvis and chest, interstices are left so as to leave a passage for the steam, which is introduced into the boilers at a temperature of from 112° to 121° of centigrade (1½ to 2 atmospheres) during a period of ten or twelve hours.

This steam, condensing on the flesh, carries with it into the space between the two bottoms the oils and the gelatine. These two products are withdrawn by means of a tap, but the gelatine is not utilised.

At the termination of the boiling, the bones and the flesh completely separated are drawn out by the door placed above the false bottom.

The former are sold to the manufacturers of animal black, the latter are placed in a press of great power, in order to remove the remainder of their oils. This flesh is afterwards picked into small pieces by hand, spread out on the ground in a hot room, dried, ground, and sifted through sieves, and afterwards sold as manure.

These operations are all very offensive, but do not appear to have any ill effect on the health of the workmen after they have once become accustomed to the work. Sickness and loss of appetite are generally experienced temporarily by those who are fresh to that or similar work. The abattoir is very isolated. The manager, M. Collignon, is a most intelligent person. His remuneration, under the police, is only 4,000 francs (160*l.* per annum). Between six and seven thousand horses are, on the average, annually slaughtered there. They are bought at an average price of from seven to ten francs.

Instructions for preserving the Public Health, and protecting the health of the artizans and others employed in cleaning and preparing intestines of animals.

Gut cleaning.

This occupation comprises the fabrication of different products employed in the arts, formed from the intestines of oxen, sheep, and horses.

The cleaners commence by separating the fat that the butchers have left adhering to the intestines, and which serves to make very inferior tallow. The intestines are first emptied, by running water through them; afterwards, in order to detach the parts of the peritoneum still remaining attached, the guts are steeped in

large barrels of water during two or three days in summer, and six or eight in winter. When putrefaction is sufficiently advanced, the intestines are thrown into buckets of water frequently renewed, and the workmen scrape them with their nails throughout their entire length. They are then ready to be blown. For this purpose the workman makes use of a piece of reed which he introduces into the base of the intestine, and with the mouth blows air into it, and makes a ligature at a distance determined by the condition of the bowel. This is frequently torn, and the apertures would allow the air to escape. Lastly, the gut so inflated is dried by the air, and taken to the sulphur room, where it is bleached and deodorized.

It is impossible to form an idea of the horrible stench which pervades establishments of this kind, and which is disengaged not only from the large vessels in which the putrefaction of the intestines is carried on, but also from the solid or liquid residue which encumber at all times the soil, and in the midst of which the cleaners live without attempting to diminish the stench developed by the process.

This extreme carelessness, which strikes with astonishment all those who have the courage to visit such establishments, arises partly from the fact of the stenches which abound there not giving rise to the fatal effects upon health which one might expect from them. Parent-Duchâtelet affirms that the emanations from these gut establishments may be breathed with as perfect impunity as the most agreeable odours. Neither the workmen who live in this pestiferous atmosphere, nor the persons who are temporarily exposed to it, according to Parent-Duchâtelet and Guersaint, experience any ill effects from it. The inflation of the bowels, however, presents strong indications of insalubrity. One has difficulty in understanding how a man can work at such painful labour as this inflation. The infectious air which comes out from the intestines penetrates his chest and causes him extreme fatigue, so that he can only continue this painful exercise for a few days at a time.

The air which passes through the bowel spreads through the factory, and carries a stench difficult to describe. Messieurs Chevallier and Guérard report that, in the visits they have repeatedly made to these establishments, they have been informed that the workmen, at the commencement of their work in these establishments, were in a few days attacked with fever and derangement of the digestive functions, which required a course of purgatives for their relief.

Use of Chlorides.

However, since Labarraque's discovery of the disinfecting powers of the chlorides, it is now quite possible to prevent innumerable inconveniences, up to that time inseparable from the preparation of intestines.

After the bowels have been cleansed from the fat, and for a barrel inclosing the small intestines of fifty oxen, there should be

used two or three buckets of water containing $3\frac{1}{4}$ lbs. of chloride of soda. The intestines then lose all colour, the membrane is easily detached, and their inflation is completed without any inconvenience; the disinfection is complete, and no change need take place in the ordinary processes of the workmen.

Messieurs Chevallier and Guérard recommend that the bowels should be emptied at the abattoirs themselves, and that they should be washed at the gut-cleaning establishments with chloride of soda before proceeding to remove the fat and inflate them.

The same authors advise the gut-spinners to utilize for agriculture the offal and other matters that they are obliged to throw away in such large quantities, after disinfecting them with charcoal or the disinfecting powder of MM. Payen and Salmon, which is only earth containing vegetable matter, and which, submitted to calcination, acts by means of the finely divided charcoal it contains.

The gut-spinning establishments are ranged, by decree of 15th October 1810, in the first class of insalubrious establishments. It is generally enacted that all these establishments should be isolated at least 100 metres from any habitation, and situated, if possible, on the borders of a river or stream. If there is no water-course near at hand, there must be a well, furnished with abundant supplies of water at all seasons.

Ordonnance relating to Gut Spinners and Manufacturers of Musical Cords.

Whereas the situation and the arrangement of the workshops of the greater number of gut-spinners and manufacturers of music strings, present inconveniences as to ventilation and discharge of the waters; that these inconveniences aggravate those that result from the imperfection of the processes employed by the manufacturers in the preparation of the intestines, with regard to the public health; and whereas while waiting till it shall be possible to improve the manufacture, it is necessary to oblige manufacturers to take the requisite precautions to diminish these evils, We therefore ordain:—

1. All persons desirous of forming any of the establishments comprehended under the three classes in the Royal Ordonnance of 14 January 1815 must apply for permission to the Prefet de Police.

2. The localities named for establishing manufactories of gut spinning or musical strings, must be at least 110 yards distant from any habitation, (except such as are equally unwholesome,) and must be situated whenever possible on the bank of a river or stream.

If there be no river or water-course in the neighbourhood, such deficiency must be supplied by a well furnishing an abundant supply of water.

A plan, showing the localities and the projected buildings,

must be appended to every application for permission to establish such manufactory.

3. No gut spinning works, or any other establishment giving out unwholesome or disagreeable smells, can be established without permission given in the forms prescribed by decree 15 October, 1810. Art. 1.

4. Every gut spinner or musical string manufacturer, whose factory is at this time legally established, is hereby enjoined, if not already provided, to sink a well that will supply in all seasons sufficient water for the requirements of the works.

5. No cesspool for the reception of the washing and steeping waters allowed to be made under any pretence.

Existing cesspools shall be filled up and suppressed without delay.

6. Waters used for washing and steeping not to run into the public pathways, but they must be collected in a barrel, placed in some vehicle, to be emptied at night into some channel or sewer or neighbouring river.

7. The barrels for the maceration of the intestines to be placed in a paved shed or workshop, open if posible to all winds.

Those manufacturers whose workshops are not so arranged, to alter them accordingly without delay.

8. The police to send in official reports of all infringements of this ordonnance.

Such infringements to be punished conformably to the laws.

9. This ordonnance to be published.

(Signed) Count Anglès.

On bone-boiling and depôts of bones, the manufacture of animal charcoal, &c.

Bones have formed, since 1813, the period at which animal black was first used in the fabrication of sugar, a very important branch of commerce.

The largest portion of bone charcoal consumed in France and her colonies was made originally in the department of the Seine; this is easily understood, as the raw material is more abundant there than elsewhere.

The bones form about one fifth of the entire weight of the recently slaughtered animal, and in Paris nearly 11,713,500 kilograms of bones are annually made use of. Every year, also, the importation of bones from the provinces and from foreign countries increases. The Departement du Nord has undertaken on a large scale the fabrication of bones into charcoal for her numerous sugar manufactories. The establishment of M. Kuhlmann, near Lille, is one of the finest and best conducted of this kind in the empire, and is indeed a model one.

All the bones collected are not employed in the fabrication of charcoal. Those which are sufficiently large, heavy, and thick, are

intended for making into handles of knives, forks, &c. The remainder are divided into two sorts, wet and greasy, and dry.

The former come from the butchers and are still fresh, or have served culinary purposes. They contain about 9 per cent. of grease. After extracting this substance from them, they are then employed, under the name of boiled bones, in the manufacture of animal black. One portion of them is treated in large coppers or boilers, in order to extract their gelatine, by the process called "Papin's." The dry bones are at once turned into the animal black. A few words on the organographic and chemical composition of bones will serve to point out more clearly their properties.

Bones contain per cent.,—

Organic matter = 50 viz.,		and	Mineral substances viz.,	50
Fibrous tissue	32		Phosphate of lime	38
Fat	9		,, magnesia	2
Albumen, vessels, &c.	1		Carbonate of lime	8
Water	8		Various salts	2

The greater part of the organic matter constitutes a spongy tissue, in which is found the mineral substances.

This tissue is transformed almost entirely into gelatine by boiling in water.

It is very easy to isolate the organic tissue from the inorganic. The bones are digested in water acidulated with from the 0·20 to the 0·25 of its weight of hydrochloric acid; all the salts of lime dissolve, and there remains a soft transparent substance requiring purification:

1stly. By aid of a weak solution of hydrochloric acid.

2dly. By a thorough washing with pure water.

The organic tissue thus purified is very supple as long as it is combined with water; it retains the form of the bone.

When it is required to extract the grease from bones, they must not be allowed to become dry first.

When fresh bones and some more or less dry are collected in considerable quantities they give off effluvia which may affect public health; therefore, these depôts should only be tolerated in large spaces of ground, situated in quarters thinly inhabited and capable of free ventilation. The fetid emanations that escape from accumulations of bones are constantly the source of loud complaints from the neighbours. The Council of Health and Salubrity of Versailles being consulted on this subject, proposed to place the mass of bones in a covered building, perfectly aërated, and to make use of a layer of animal black requiring revivification, and even, if necessary, new active black, in order to absorb the emanations. These applications are certainly to be approved, but are they sufficient to prevent putrefaction, so readily developed in animal matter, having once commenced in the heap of bones? These heaps, disturbed to furnish material for the day's work, will be certain to allow the emanations momentarily shut up in their interior, to escape through the openings. It appears clear that the means indicated would essentially fail in the necessary con-

dition, namely, that of a permanent and continuous effect. As to using the perfect "animal black," we are of opinion that if applied according to the quantity that would be necessary to insure its efficacy, it would cause so much expense and difficulty that few manufacturers would faithfully carry out such a measure.

The Council of Health and Salubrity of Dunkirk was consulted in 1852, as to a request made by a possessor of such a depôt, and who, by a simple order of police had been obliged to shut up his works. The police order was founded upon:

1. As depôts of bones were classed in the second rank of insalubrious establishments, the Prefect of Police alone has the regulation of such.
2. As the establishment was anterior to the promulgation of the decree of the 15th October 1810, the regulations in article 11 of the said decree were applicable to it.

The following was the decision arrived at by the Council:—

1. Mr. ——— must only admit into his warehouse kitchen bones perfectly clean and dry; the quantity accumulated at one time never to exceed 200 kilograms (about 420lbs.)
2. He is formally interdicted from receiving any other osseous matters coming from the public knackers or the tanneries.
3. Twice a week, Tuesdays and Saturdays, the warehouse to be completely emptied.
4. The spot where the bones are deposited shall be perfectly ventilated; it shall be paved with hard stone, and cleaned carefully the two days named.

If depôts of bones are a powerful cause of insalubrity, the operation of extracting the grease from them disengages odours much stronger and much more disagreeable. This industry is directly connected with the manufacture of animal charcoal and of bone buttons. The Council of Health of Bordeaux was consulted in 1851 as to the keeping up of an establishment for de-greasing bones, to which was annexed a manufactory of bone buttons.

The following was the adjudication:—

"The Commission, after due examination of the places and factory, has not shut its eyes to the inconveniences attached to de-greasing bones; but these inconveniences will be annulled if the following conditions are made peremptory:

1. The bone-boiling shall be performed in a close boiler.
2. The internal pressure of the boiler never to exceed an atmosphere and a-half.
3. The boiler to be furnished with the safety apparatus required by the Royal Ordonnance of 1843, regulating steam-boilers.
4. The greasy waters cannot remain more than 24 hours in the establishment, and cannot under any circumstances, be poured on the public ways or shut up in the establishment.
5. After having been boiled, the bones are not to remain above 24 hours in the establishment.
6. The furnace chimney must be elevated at least 8 metres above the soil.

With these conditions, the public health and security have appeared to your committee sufficiently provided for."

After the bones have been sorted, so as to make use of the best for table use, and after having been de-greased and half-dried in the air, they are *carbonised* for the formation of animal black. This product is obtained by heating the bones out of contact of the air, by decomposing the organic matter and volatilizing the gases, so as to sift out the charcoal interposed between the inorganic substances. The quantity of charcoal contained in the black of bones is about 10 per cent.

The bones are carbonized in cylinders or in large melting pots of baked earth, which are generally three-tenths of a meter in diameter and four-tenths in height. They are then gradually heated in a furnace to a white heat, which is maintained from six to eight hours, and the pots when cold are removed. The charcoal is then powdered between cylinders.

The manufacture of animal charcoal itself has no special inconvenience, except the dangers inherent in all operations which put in movement pulverulent bodies, and which require considerable heat by means of ovens or furnaces, which may cause danger from fire.

What requires the strictest attention to be devoted to this class of works, however, is, that frequently they join together several different sorts of works, and become in fact several knackers' establishments, factories of animal charcoal, and of manures.

Powdered animal charcoal is principally employed in the clarification of sugars and vinegars. This operation consists in adding, for sugar, three kilograms of animal charcoal in fine powder to 100 kilograms of raw sugar, with one or two kilograms of albuminous matter coagulable by heat; bullocks' blood beaten and thus deprived of its fibrine, then mixed with four times its volume of water, is made use of for this purpose. The residuum of the animal charcoal is sold as a manure under the name of "black from the refineries."

Ordonnance respecting depôts of manure and of collections of animal matter.

WHEREAS there is constantly formed in country places in the suburbs of Paris a considerable number of depôts of manure composed of mud, sweepings of the streets, filth, and remains of animal matter, which give out infectious exhalations; and whereas it is important to preserve the habitations as well as the high roads from the unhealthy effects that might be produced by these exhalations;

We ordain,

1st. No depôt of manure composed of animal débris coming from the abattoirs, or gut spinners, or knackers, or glue factories, or other workshops of the kind, shall be formed at a less

distance than 220 yards from any habitation, and 110 yards from the high roads.

2d. If these manures have not been made use of for the space of two days, counting from the day on which the depôt has been made, the agriculturist while waiting to make use of it, is to place it in a ditch and cover it over with a layer of earth two inches at least in depth.

3d. All deposits of mud and filth intended for sale, with the exception of the contents of the sewers ordered for sale by the authorities, to be kept at a distance of 280 yards from habitations, and 110 yards from the high roads.

4th. The above orders not to apply to dung of horses, cows, and sheep.

5th. Infringements, when proved, to be punished according to law.

6th. This present Ordonnance to be printed and published.

(Signed) G. Delavau.

Ordonnance concerning Depôts of Manure and Filth in the Suburban Parts.

We ordain:

1st. No depôts of mud and filth, except those coming from the sewers and ordered to be sold by the public authorities, are to be made without our authority.

2d. In no case shall authority be granted to form such depôts in the interior of court-yards, gardens, or other enclosures contiguous to habitations, or in open spaces which are at a less distance than 200 metres from every habitation, and 100 metres from high roads.

This distance may be shortened when the high road is only used for agricultural purposes.

3d. When the mud and filth are being applied as manure to the soil, it shall be done within twenty-four hours of their being brought to the spot.

4th. Horse, cow, and sheep dung not to be included in the above articles.

5th. Infringements to be punished.

6th. The Ordonnance of 31st May 1824 to be abrogated.

7th. This Ordonnance to be published.

(Signed) G. Delessert.

On the large establishment for the manufacture of Poudrette, or artificial manure, in the Forest of Bondy, near Paris.

Paris being entirely unprovided with a system of sewerage, the whole of the night soil has to be removed by manual labour.

This is done in the following manner, and with the following results:—

The houses are provided with cesspools, either fixed or moveable. The former are known by the term "fosses immobiles," the latter "fosses mobiles."

The former are emptied in two ways, either by the descent of men into them, or by withdrawing their contents by means of a large iron cask or tumbril, exhausted of its air, connected with the cesspool by means of a flexible tube. Although this latter method was far less objectionable than the former one, as the workmen were saved a considerable amount of very filthy work, and the fosse was emptied with much greater rapidity, and a much less amount of nuisance was caused during the operation, nevertheless the mode of emptying by exhaustion has been obliged to be abandoned, on account of the great expense of keeping the apparatus in a state of efficiency. The large iron vessels formerly used in this process are now employed in the old method. But the greater number of houses in Paris are supplied with strong wooden barrels, which, when full, are removed, and their places supplied with others empty. This industry is carried on by contractors, who perform their contract under the strictest police regulations. The firm that contracts for the greatest number of the houses in Paris is named Richer and Co., who, I am informed, do this work for five-sixths of the houses in the capital. Their establishment is very large, and the operations are carried on with as small an amount of bad smells as such a business will admit of. They adopt what is called the "système diviseur." This consists in receiving all the night soil in a fosse with a false bottom and sides, which, being perforated, allow the liquid portions to escape by means of a tube and stopcock into another fosse in connexion with the first receptacle, and which second fosse, not being perforated, retains the liquids.

The contents of the fixed cesspools are removed in very large barrels; and the moveable cesspools themselves, containing separately the liquids and solids, are conveyed in carts to a place constructed for this purpose. It is called the Dêpotoir, and is situated just outside of Paris, at the Barrier of La Villette. From this place a canal is constructed to Bondy, and by this canal the large and small barrels, containing the solid matters, are conveyed to the manufactory of poudrette at Bondy in barges.

The liquid portions are not conveyed in that manner. The distance between the Dépotoir at La Villette and the forest of Bondy is about 12 kilometres. A large iron tube runs underground from the former place to the latter, and the liquids are pumped, by means of a powerful steam engine, through this tube to the place of reception at Bondy.

The manufacture of poudrette is carried on in the interior of the forest of Bondy, at a distance of 13 kilometres from Paris. It is at a distance of about a kilometre in a direct line from the public road, and surrounded with trees.

These and other precautions, however, by no means prevent

this factory from being a very great nuisance, and a pregnant source of complaint from the inhabitants of the neighbourhood for a very considerable distance round it.

When I visited this locality, although the weather was very cool, the odours made themselves perceptible at a distance of five kilometres; and I am assured on good authority that in hot weather, with a wind blowing from that direction, the smell is distinctly perceived in the metropolis. I was particularly struck with one circumstance regarding the smell given off, which was strengthened by the evidence of M. Trebuchet, the Chef du Conseil de Salubrité, who accompanied me. It was, that the odour was far less offensive at the factory itself, where the work was being actually carried on, than it was at a considerable distance from it. M. Trebuchet assured me that this fact had been observed by himself and numerous other persons.

However, the complaints from owners of property in the neighbourhood are both loud and deep, and I am informed that the value of property has considerably diminished since the factory has been established there.

The process of manufacture is as follows:—

The solid matters, arriving in the large and small barrels by canal and boat from the Dépotoir, are emptied into one of two very large basins excavated in the soil. These are each about two acres in extent, and ten feet in depth. From these receiving basins the liquid portions pass slowly off to other basins; and after depositing the more solid portions therein, the liquids pass off to other basins, numbered 3 and 4, consecutively. The liquids from the last basin (No. 4) are sold to the proprietor of a large establishment erected contiguously, and sulphate of ammonia is extracted from them after the deposition of as much of the solids as possible.

The solids that have been deposited are dried by long exposure to the air and by frequent turning by hand, until after a lapse of time, varying from two to four years, they become so dry as to fall into a powder; and this is then disposed of under the name of poudrette.

Although, from the evidence brought before me, there is little doubt that this poudrette is a very fertile species of manure, still there is a great prejudice against its employment among the farmers and market gardeners in the neighbourhood of Paris. The conductor of the establishment informs me that it is all sold to farmers residing in distant parts of the country. He added that no farmers will purchase the liquid, nor indeed would they use it even if given to them for nothing. This has been tried.

The town of Paris is paid 85 centimes for every cubic metre of solid and liquid that enters the factory.

The voirie of Bondy, where the poudrette is made, measures superficially 32 hectares. The eight basins which receive the liquid and solid matters hold 160,000 cubic metres. The Canal de l'Ourcq is the medium of transport of the solids from Paris.

Manufactories of glue and size, placed in the 1st and 3d classes of insalubrious establishments according to the materials used in their manufacture.

Glue. Size.

Under these names are distinguished those adhesive substances that are prepared from animal matters more or less rich in gelatine, as membrane, skin, fascia, tendons, cartilage, bones, &c.

The raw material used in the preparation of glue are—

Scrapings of skins prepared by the leather dressers, called *brochettes.*

Buenos-ayres or packing skins and parings of skins coming from Brasil.

The soles or large tendons of oxen.

The clippings of parchment.

Pieces rejected by the tanners, as sheep's ears, calves' toes, tails, &c., and lastly, bones, which scarcely fifty years ago were accounted of no use whatever, and which are now become so great an object of industry as to be imported from foreign countries.

The preparation of the tendinous and membranous materials consists in macerating them for several days in milk of lime, then straining and drying them, afterwards separating them in boiling water in a water-bath, continuing the ebullition until the liquid in the boiler on exposure to cold air becomes a thick jelly.

To extract gelatine from bones, the grease must first be extracted, for which purpose they are boiled in water, after being broken in small pieces; the grease melts and floats on the surface of the liquid, from which it is removed with a spoon. After removing the grease, the gelatine of the bones may be extracted by two different methods:—

1st. By heating in a boiler called "autoclave."

2d. By removing the calcareous salts contained in the bones by means of muriatic acid.

In the first process, the bones are mixed with lime, which separates the last remains of grease from them, then submitted to the action of very hot water = 248°, in a boiler capable of supporting a pressure of several atmospheres. At this elevated temperature the bones become soft, the gelatine dissolves in the water, and the calcareous matter, while preserving its form, loses its hardness.

By the second process, the bones are macerated in tubs containing muriatic acid of ten degrees of strength at the most; by this operation, the carbonate and phosphate of lime in the bones are dissolved, and the animal matter remains untouched. After being removed from the acidulated water, the bones are drained, washed, then allowed to macerate sufficiently long to saturate the hydrocloric acid and the acid phosphate of lime remaining in the waters; lastly, when the alkaline maceration is finished, the bones are boiled in a steam boiler, as if they were membranous substances.

Before the glue is run into buckets, it is clarified, if not already

very transparent, by means of alum, if it is alkaline; by albumen if neuter. Lastly it is dried in a drying room.

The factories of glue are classed, by the Ordonnance of 15th October 1820, in the *first class* of inconvenient or unwholesome establishments, on account of the bad odours they cause. However, when bones only are used, they are placed in the *third class* by the Ordonnance of the 9th February 1825.

Messieurs Montfalcon and de Polinière remark on this subject, that flesh is frequently made use of in establishments only authorized to extract gelatine from bones, and that sometimes there is great difficulty in providing against such an infringement.

Glue manufactures, therefore, are not authorized within a certain distance of inhabited places, and in taking into account the ordinary direction of the winds; it does not, however, appear that they present any condition of real unwholesomeness.

The waters running from these factories are charged with a certain quantity of animal matter as well in solution as in suspension; they give off a disagreeable odour, and take on putrefaction very rapidly. They must be discharged, after as short a journey as possible, into cisterns or butts, which must be emptied on a neighbouring field or meadow, or into a sewer if the locality permits.

On tanning, dressing, and currying leather.

Like all establishments in which animal matters undergo preparation, tan yards are foci of emanations, more or less disagreeable, but which can scarcely be considered noxious.

There is scarcely any town of importance where such establishments do not exist, and every where councils of salubrity are unanimous in acknowledging that leather dressers present but few inconveniences, and authorise them under certain conditions.

The preparation of skins comprises a series of operations, which it will be useful to repeat.

The skins, brought in fresh or green or previously salted and dried into the establishments for tanning, are immediately submitted either to immersion in lime or to the action of steam or of a current of hot water, or lastly to the action of running water, after which the hair is easily removed by scraping. This first part of the operations, which the neighbourhood of a stream of water much facilitates, is known under the name of "rivering," and explains the situation of the greater number of tan-yards. It may, however, without difficulty be carried on in the interior of the establishment.

The hide thus prepared is submitted to the operation of tanning, either by alternate layers of skin and tan or bruised bark of oak, or by the action of alum. To these very long operations succeed the drying, and subsequent greasing by aid of melted tallow or oils. The manipulations of the currier and of the morocco maker, who place the skins, more or less finely prepared,

in a state to be worked, are less complicated, and consist chiefly in moistening, beating, greasing, and dyeing the leathers.

This short description is sufficient to show that the work of the tanner gives rise to the production of a great quantity of solid and liquid residues of organic nature and easy of putrescence, an accumulation of which would constitute an evident cause of disease. But these inconveniences may easily be avoided by means of certain very simple precautions.

The fresh skins should be immediately, at the moment of their arrival, plunged into lime water or into any other liquid that will render them imputrescible. The subterranean reservoirs for receiving the foul waters, the coppers, the pits, ought to be perfectly air-tight; the courts and all the dependencies of the manufactories should be paved with well jointed sandstone, and should present an inclination sufficient to direct all the liquids to the general receptacle.

The dirty waters, called greasy waters, must be transported out of the establishment, either by subterranean drains or in well closed barrels, as far as a stream of water, where they may be emptied without inconvenience. The mass of hair and tan must not be retained in the interior of the works.

Tanneries, currier's yards, and leather dressers are classed in the *second* class of unwholesome works.

A peculiarity, only recently pointed out, relating to the influence of the profession of tanning is worthy of notice.

The leather dressers of Annonay, according to M. Armieux, and undoubtedly also, those of all countries, are subject to diseases of the fingers not described by any author. The first consists of an ecchymosis which invades the internal portion of the fingers where the epidermis is very thin. This ecchymosis, which has a blackish appearance, remains in this state several months without becoming troublesome or painful; but more often the skin ulcerates, and then the workman undergoes most severe sufferings by the contact of the bleeding surfaces with the lime, which it is impossible to avoid using in preparing the skins.

Some few days of repose, and the application of a simple ointment, usually suffice for the cure of this malady; but it relapses frequently when the workman exposes himself anew to the cause which has produced it, constant contact with lime water. The workmen call this disease *cholera of the fingers*.

The second disease is named by them *Nightingale*, because it is still more painful, and makes them throw out cries of pain. This consists in a small cavity which forms at the extremity of the pulp of the fingers; this cavity, which appears to be capillary, is due to the thinning of the skin corroded by the lime. There is exudation of small portions of blood, communication of the atmosphere with the nervous papillæ, and severe pains.

The workmen continue their trade in spite of this, and do not appear to experience any evil consequences therefrom. The mischief disappears without any medicine, by the mere cessation from work.

"If the workmen," says M. Armieux, "would prevail upon themselves to wear oilskin gloves, it is probable that they would preserve themselves from these disagreeable accidents. I have recommended them, but they have invariably replied, 'It is not the custom,' so true is it, that routine is the most terrible and incurable of evils."

On various establishments of tanners and curriers in Paris.

The tanneries of Paris are under the strict surveillance of the police, and are not allowed to be established in any locality that is not provided with an abundant supply of water. The more important establishments of this kind, indeed, in the interior and in the suburbs of Paris, are situated on the banks of some running stream, and preference is always given by the authorities to such works as select such a site for the erection of their factories.

The greatest attention is required to be given to ventilation, so that thorough currents of air are established in all the workshops.

The first step in the process of converting hides of animals into leather, a step common to all factories as well in France as in England, is the placing the hides in a mixture of lime and water, known by the name of the lime bath.

This has for object to remove the hair by the caustic quality of the lime. The next process, which appears to be in universal use among the tanners in the vicinity of London, or at any rate among those whose works I have had occasion to visit in Bermondsey, is one that I have been informed by some of the London tanners as quite indispensable.

Its object is to remove the superfluous lime, which, from long contact with the skin, lodges itself in the pores or cellular tissue thereof. This is attained in the London factories by steeping the hides, after the removal of the hair, in a solution of the putrified dung of dogs, pigeons, or certain other animals. To so great an extent is this process carried on in the metropolis, that I am assured by the local police and other persons, that between 300 and 400 persons are employed in collecting the feculant matter from these animals, especially dogs. This is purchased by the tanners, by whom it is known under the name of "pure."

I am informed that the term is intended to convey the idea of the dung so purchased consisting purely of the dung of dogs, without admixture of that of other animals.

This fæcal matter must be kept in mass until it is in a state of hot fermentation, when it gives off large quantities of carbonic acid, sulphuretted and phosphuretted hydrogen gases. It appears then to be fit for use.

But this process constitutes by itself a very considerable nuisance. The gases given off from the fermentation of this excrementitious matter, pervade more or less the whole establishments, and can be smelt at a considerable distance. In inquiring into

this part of the process of dressing leather in Paris, with the object of learning what other, if any process, could be substituted for this most objectionable operation, I learn that it is utterly unknown in France. I am informed that the lime is most completely removed from the skins by the French manufacturers, by various mechanical processes. These all assume the form of pressure, with complete washing with large quantities of water.

The most perfect plan for removing the lime left in the skins that I have seen in operation in the French factories, is the one invented by Messrs. Artus, and patented by them in France, though not, I believe, in England. It is known by the name of—Appareil purgeur Système de Artus frères, vendeur de l'appareil. 1853.

Constructeurs { M. Delpech, méchanicien,
M. Choureaux, tonnelier, Paris.

It consists of a large, hollow, wooden wheel, $2\frac{1}{3}$ metres in diameter, fitted in the interior with a number of blunt wooden teeth, and pierced with numerous holes. A tap, connected with a cistern of water, opens into the interior of the wheel, into which the limed skins are thrown, and the wheel is then rotated rapidly by the steam-engine that works the other parts of the factory. The water escaping through the holes is for some time very white and turbid, from its containing a certain quantity of lime; but this gradually being washed out of the skins, in a period varying from twenty minutes to an hour, according to the size and number of the skins in the apparatus, the water comes out as it went in, and the skins are then found to be free from the caustic material. One such apparatus will, I am informed, cleanse from lime a great number of skins. Messrs. Artus, who only, however, prepare the smaller sized skins for varnishing, have only two of these appareils, and thus finish 1,200 skins per day.

The apparatus complete costs 2,000 francs, or 80*l.*

Another improvement relating to the business of tanning, but not having reference as the one just described has to the public health, is a patent that has lately been taken out for forming the shavings and scrapings made in dressing and currying the skins into good solid leather fit for manufacturing into soles or boxes.

This is done by steeping these remnants in glue, and afterwards submitting them to considerable pressure.

This patent is secured by M. Roulier, 24, Rue St. Bernard, Paris.

The factory of M. Leven, père et fils, Rue St. Hippolyte, No. 10, is a model tannery establishment. The health of the workmen is better than at any other similar works in Paris or elsewhere that I have visited. The paving, ventilation, drainage, and lighting, are all effected in a most superior manner.

Some of the largest skins are not steeped in milk of lime at all in M. Leven's factory.

On the precautions necessary to be adopted in the exhumation of dead bodies.

THERE are circumstances where the necessity of recognising the identity of a body, or of searching for the traces of a crime, or other reasons, make it a duty to remove a corpse from its grave, or authorize this operation, a thing otherwise altogether an exception to our ordinary manners and habits.

The putrid decomposition that goes on in corpses, and the miasmata they exhale, necessitate great precautions. But the dangers that the act of exhumation presents have been much exaggerated. The emanations given off from animals in a state of putrefaction, when exposed to the open air, appear generally free from much inconvenience to the health. Parent-Duchâtelet made many observations on this subject in the public knackers' yard of Montfaucon, proving the complete innocuousness of an enormous accumulation of putrefying flesh. The exhumations of the cemetery and of the church of the Saints-Innocents in Paris, performed in 1785-86, lasted six months; more than from 15,000 to 20,000 corpses, belonging to many ages, were exhumed with their coffins. "One remarked," says Thouret, "all shades of destruction, all the metamorphoses of death assembled, from the body which was in a state of solution and putrefaction, to those that were changed into mummies, dry and fibrous; notwithstanding which, no accident whatever happened among the workmen or neighbours.

Gravediggers have themselves observed, moreover, that they are only exposed to real danger in the *first period* of the decomposition of the bodies; that is to say, some days after their interment, when the abdomen, after having been distended by gas, is rent about the lower part, and the navel; a sanious, brownish fluid, of a most fetid odour, escapes through the apertures, and there is at the same time disengaged an elastic fluid, very mephitic, the dangerous effects of which are strongly to be feared.

Parent-Duchâtelet remarks, that every year there take place at Paris, in the cemetery of Pere-la-Chaise, nearly two hundred exhumations, to transport into lands acquired by the families, or into proper sepulture, the corpses which had been provisionally buried in the private trenches. These exhumations take place at all times of the year, two, three, or four months after death, often much later. One can conceive that putrefaction is at that time in all its activity, but nevertheless, it has not yet been found that any, the slightest accident has happened to the gravediggers employed on this work, which is the more troublesome, and which should be the more dangerous, that they are obliged to respire in the same ditch the emanations which have been confined there a long time in a narrow space.

As regards the manner of performing exhumations for judicial purposes, and the precautions necessary to be taken, we must, says M. Orfila, make a distinction between a case in which a corpse is simply being removed from a particular trench, and that which intends to cause the evacuation of cemeteries and sepulchral vaults, or the extraction of a corpse from a common trench.

Although there is really no danger in the extraction of a corpse from a private grave (fosse), it is nevertheless proper to take certain precautions, if it were only to diminish the inconveniences of the operation. This should be performed in the morning, particularly in hot weather; several workmen should be employed, so as to finish the work as quickly as possible; the grave and coffin should be sprinkled with chloride of lime; but M. Orfila recommends that none should be sprinkled on the corpse itself, the essential conditions of which might be considerably altered by such application. The necessary researches should be made as soon as possible after the corpse has been extracted from the coffin, for contact with the atmosphere accelerates rapidly the decomposition.

Exhumations for emptying a cemetery, or which require excavations, demand much more rigorous precautions than the above. If one is free to choose the season, the coolest weather should be selected, and the operation should be suspended if the weather becomes hot, and the wind blows from the south. As many workmen as possible should be employed, and any gravediggers that become affected should be forthwith replaced. The clothes should be changed every other day, and carefully aerated.

The instruments should be provided with long handles, so that the gravediggers should not be obliged to bend forward. The soil should be well sprinkled with chloride of lime.

If the men are forced to enter a cave or pit, a current of air must be previously carried through it, by means of a lighted stove or some similar means.

The safety of the confined air there must first be ascertained by putting down a lighted candle, and no one must enter if the candle does not burn as it would in the open air. The first workmen who descend should have a handkerchief, steeped in vinegar, applied to their mouths; they should be suspended by a cord, passed under the arms, so as to be drawn out quickly in case of danger.

Solution of chloride of lime should be spread about in the pit.

The same precautions should be used in removing a body from a common trench.

Candle making.—Regulations in force in France.

Candles are manufactured in two modes, by dipping, or by running into moulds.

Mould candles are made by running the tallow, sufficiently melted, into tin or glass moulds placed vertically in a frame, and in which moulds the wick has been placed.

Dip candles are prepared by passing the wick at first two or three times over a bath of melted tallow, afterwards plunging it into the bath enclosed in a framework of wood, and replunging it several times, allowing the tallow to run off and harden, until they have acquired sufficient thickness.

Candle manufactories have nothing insalubrious about them, but they give off an insipid and sickly odour extremely disagreeable, and are liable, besides, to great danger from fire. They are therefore placed in the second class of insalubrious works.

No establishments for melting tallow should be permitted elsewhere than in suburban districts; they ought not to be tolerated in towns. If the factory is close to an inhabited place, a street, or a promenade, no authority will be granted except on condition of surrounding it with a wall 8 or 10 metres in height, without any door, window, or opening, on the side of the street or promenade. Provided, however, the locality chosen be proper, manufactories of candles present neither danger nor serious inconveniences.

The Central Board of Health of the Département du Nord has decreed:—

1. That all boilers used are to be surmounted with a hood for conducting the vapours into the chimney.
2. All tallow made use of to be purified beforehand.
3. To place the boiler used in melting in another locality, that is, not in the same chamber as the hearth and cinder holder.
4. Interdiction against using presses for graves (animal fats).

On the manufactories of Prussian Blue, classed in first division of insalubrious establishments.

The manufacture of Prussian blue, so much used in the arts, may be accompanied by grave inconveniences and real danger if old processes are employed. At the present time, remedies for these inconveniences and dangers are known.

All organic nitrogenous substances may serve for the preparation of Prussian blue. Those ordinarily made use of are, dried blood, horns, horses' hoofs, leather heated in a crucible, with an eighth of its weight of potash and a little iron filings. When all these ingredients are converted into a paste, they are removed with an iron spoon, and thrown into hot water; violent detonations then take place, which might prove dangerous for the workmen if the boiler was not covered with a dome of sheet iron, presenting an aperture only large enough to admit the spoon. The liquid, after boiling a sufficient time, is filtered through linen, and the residue being lixiviated anew, all the liquids are mixed together, and precipitated by a solution of a mixture of sulphate of iron and alum. When the lixivium of fresh blood is mixed with a solution of sulphate of iron and alum, a large amount of sulphuretted hydrogen gas is liberated, which might give rise to accidents; but D'Arcet has proposed an apparatus which prevents all such accidents. It consists of a large barrel, closed by a cover, provided with a funnel through which the liquids can be introduced, and an agitator or stirrer fastened by means of a leather or bladder to put the whole in movement; lastly, a pipe intended to conduct the hydro-sulphuric acid gas as it is generated into the fire-box of a furnace, where it is completely consumed.

All the inconveniences disappear if another process is followed; this consists in employing ferro-cyanide of potassium, a salt containing no sulphur.

The Boards of Health only authorize manufactories of Prussian blue on condition that all the flues and chimneys of the boilers communicate with the chimney, 15 feet in height, of the calcining furnace, and that the waters of lixiviation of the manufactory shall not remain either in the culverts, trenches, or public ways.

On the Hygiene of soap boiling.

The fabrication of soap is not of itself very insalubrious.

If it finds a place among the classed establishments, it is only in the third class, and that is on account of the lixivium and the disagreeable smoke that it gives off. But there is one very important point as to the salubrity of soap factories, viz., the nature of the solid and liquid residues resulting from the manufacture, and which, easily decomposable, may give rise to considerable disengagement of infectious vapours and sulphuretted hydrogen gas. These different circumstances give peculiar interest to the hygienic study of soap works, and justify the details about to be entered into.

The Councils of Public Health of the Bouches-du-Rhone and the North, in which this manufacture is largely carried on, have brought to light many important elements for this study.

A soap factory comprises three distinct parts: the first consists of trenches or basins, known in the south under the name of *barquieux*, where the carbonate of soda, the lime, and the water for dissolving them, are placed.

The second comprehends the boilers, from five to six metres in depth, built in hewn stone, at the bottom of which is the hearth.

The third consists of chambers called "*mises*," intended for cooling the paste.

The following are the functions of these three parts:—The soda mixed with the water and lime in the *barquieux* gives rise to a solution, which, by means of a conduit, is conveyed into the boilers placed opposite each other. In the boilers is placed the oil, which, by its mixture with the soda, yields soap after a sufficient boiling. When the materials have attained the required consistency, they are withdrawn from the boiler, and placed in the chambers or "*mises*," where they are cooled.

Besides the three portions just described, there exists a supplementary part, which, as far as respects public health, is that upon which attention should particularly be fixed. When the matter placed in the boiler has undergone a first boiling, the workman withdraws from the surface the portion that is ready for furnishing soap, and carries it into the "mises," where it is to cool. The residue of this matter, in which are the elements of soap not yet separated, is submitted to more boiling, by which these elements are then extracted.

This second operation gives rise to a last residue, which is called lixivium or "lessive" reboiled, and is of no known use. This lessive has a disagreeable, if not a noxious odour. At Marseilles,

it is run into the sea by subterranean canals, and, without any doubt, it is not the slightest cause of the insalubrity of that port. In other places this lixivium is enclosed in stone pits placed five or six metres below the level of the soil. These basins should be hermetically sealed, and the masonry forming the walls should permit no infiltration to vitiate the springs or waters of the neighbourhood.

Under all circumstances, the solid residues arising from saponification should always be placed provisionally in covered sheds, so that rain waters cannot have access to them and spread them on the public highways, and the liquid residues should be carefully collected in a pit or in a perfectly air-tight recipient, to be emptied occasionally.

As to the smoke and the thick and nauseous lyes which are produced during the process of saponification and the drying of the paste, it is of importance to prevent their dissemination in the environs of the factories, either by combustion of the vapours or by their expulsion through very lofty chimneys.

There is one other peculiarity which should not be passed over in silence, since it concerns the life of the artizans employed in stirring the paste in the boilers. In some works there has been danger of the workmen being precipitated into the boilers of boiling lye. M. D'Arcet has proposed employing a strap and suspension cord fixed to a bar of solid iron, which would be a safeguard to the workman; this is a precaution which should be by no means neglected.

On tallow melting, with suggestions for improving the usual processes.

THE commerce of tallows has lost much of its ancient prosperity; the progress of industry, and particularly the discovery of carburetted hydrogen gas, as a method of lighting, have singularly confined the consumption and production thereof.

The tallows extracted from animals are either melted in vast stoves, which, placed in the open air, contain as much as 7,000 kilograms at one time, or they are melted by chemical means in closed vases. The first method is very simple: journeymen melters stir the material with a species of ladle, $2\frac{1}{2}$ metres long, during the boiling, in order to prevent any portion from adhering to the boiler. A vapour, heavy and nauseous, rises above the boiler; it spreads its fetid odour as far as the outskirts of the abattoirs, and causes frequent complaints on the part of the neighbours, who forget that they came to fix their abodes in the vicinity of the melting houses long posterior to the establishment of the abattoirs, for the police ordonnances have long ago forbidden tallow melting to be carried on elsewhere in Paris than in the abattoirs.

The melted tallows naturally leave a residue, which is made to undergo great pressure under a powerful press, so as to extract al the grease.

The residue of this is known by the name of "graves," and is sold for the food of pigs and dogs, and may be advantageously employed as manure.

The second method of melting tallow is that which is performed by chemical processes in closed vessels. This method excludes the production of graves, which is composed of the débris of flesh attached to the fat. In this case, there are introduced into the vessels intended for the melting acids which change these particles of flesh into fat, so that the melting only produces tallow without residue. The tallow melted in closed vessels, by this method, has less odour than that melted in open boilers; the acid modifies the nature of this odour, which at first was not unwholesome in spite of its disagreeableness; but thus modified, it assumes, according to M. Bizet, a truly insalubrious character, although it is less nauseous to the smell.

According to this author, the workmen employed in this latter kind of work experience pains in the chest, with a feeling of illness that they do not suffer from while melting in the open boilers.

Many methods have been proposed to destroy or carry off the odour of the vapours of tallow; sometimes chloride of lime has been used, sometimes a ventilating flue, sometimes pipes for conducting these vapours into the furnace in order to consume the inflammable matters they contain; lastly, it has been proposed to use autoclave boilers. Of all these methods, some are insufficient, others only feeble palliatives, while others present in their application dangers which prevent their use.

The most certain mode of not presenting incommodious vapours would be to avoid the production of any vapours. It is with this object that M. Delunel proposed the heating the raw tallow in a water bath. The advantages which he describes as resulting from the use of his process, are to furnish a finer quality of tallow, to avoid all danger of fire, and to give off no insalubrious odours. Unluckily his process has not been able to be put into execution profitably; for although tallow melts considerably under the temperature of boiling water, it requires a much higher temperature to permit the fatty matter to break by its dilatation the cellular tissue in which it is enclosed, and which imprisons it. We owe to M. Darcet, whose name is attached in so honourable a manner to all questions relating to industry, the knowledge of a process of open fire melting, which presents the fewest inconveniences. M. Darcet Method.

This process consists in introducing the raw tallow, cut into small pieces, into a boiler of copper, and to heat it there in contact with a certain quantity of water and sulphuric acid.

The proportions recommended by M. Darcet are as follows:—

Tallow - - - - -	100 parts.
Water - - - - -	50 „
Sulphuric Acid - - - -	1 „

The quantity of sulphuric acid may vary according to the nature of the fats to be melted.

This process presents, according to the author, great advantages in various respects. Although there are still sebacic vapours given off, they are less strong and are modified by the action of the sulphuric acid; the tallow being produced at a less elevated temperature, preserves a great whiteness, and acquires more firmness on cooling than in the ordinary process. The action of the acid seems to have specially for its object to react chemically on the cellular tissue, and, consequently, to facilitate the exit of the fatty matter which it envelopes. The graves dry better than by the old method. One hundred parts of raw fat leave but eight parts of graves by the acid process, whereas the same quantity leaves fifteen by the old system.

The graves press, so largely employed, becomes almost useless by the use of the acid.

The adoption of the process of M. Darcet is, therefore, a most valuable improvement in the melting of tallow. Nevertheless, this process is not free from odour.

To get rid of these incommodious vapours two means present themselves: one to cause them to be consumed in the fire-place, the other to direct them into the drains, as has been proposed at Nantes; but, besides the inconvenience of interfering with the operations, of increasing the cost of the apparatus considerably, as the boiler must be closed and provided with tubes, the first method would render it liable to explosions, by the obstruction of the pipes, or to fires by the communication of fire to the boiler through the pipes; the other method could not be applied in all localities.

The cause of the odour is evidently the long boiling to which the fat must be submitted in order that the cellular tissue should yield all its grease. In searching for methods of ameliorating the processes of melting tallow, sufficient attention has not been paid to the causes which determine the production of the infectious vapours. If the existence of the cellular tissue necessitates the prolongation of the boiling process to permit the escape of the whole of the grease, the method of hastening this melting would be, it appears to us, to break up the cells before the application of the heat, and, to effect this, *the fat should be previously chopped very much finer.* This method, inducing an easier melting, would avoid a great proportion of the vapours which are given off, and even might, in some cases, dispense with the use of the acid, which causes the loss of the value of the graves, and which (acid process) cannot be carried on in the brass boilers which are now in general use. If, by means of suitable apparatus, the cellular tissue can be economically broken up, no doubt but that it would be useless to prolong the melting in order to extract all the grease, and the press alone, after the application of a temperature of 100 Centigrade (212° Fahr.) obtained by water or steam, would doubtless suffice to extract all the tallow, in taking care to facilitate the running off of the melted portions.

Tallow melting is one of the manufacturing operations the most disagreeable, by the infectious and irritating smell which commonly results from it, and which is conveyed to great distances; the

decree of the 15th October 1810, has ranked tallow melting among the insalubrious fabrications of the second class, on account of the incommodious smell and dangers of fire resulting from it. As the consequence of this classification, the banishing from dwelling-houses is not rigorously necessary, but the setting up of tallow-melting establishments is submitted to a previous examination on the part of the authorities, to make certain that the operation, as it is proposed to carry it out, is not of a nature to inconvenience the proprietors of the neighbourhood, or to cause them damage.

It was, however, soon discovered that the nuisance to the neighbourhood of these works was far too great to tolerate their existence in the outskirts of towns; therefore we find in the general statement of the dangerous, insalubrious, or incommodious establishments, drawn up in 1826, by order of the Minister of the Interior, the melting of tallow *by the open fire*, as it is generally practised, ranked in *the first class of insalubrious fabrications*, while the melting by water bath or by steam is retained *in the second class*.

But, as laws cannot have a retroactive effect, the result has been, that, at the present time, we have a great number of melting houses in the towns, authorized in virtue of the decree of 1810, or the existence of which was anterior to this date. The inconvenience caused by these establishments, especially when on a large scale, is such that it has been considered already sufficient to give rise to two ordonnances, one of 20th February 1821, which suppressed a melting establishment at Rouen, and the other of 17th October 1826, which did the same at Mans; and, in these two cases, from the time that our legislation on unwholesome establishments exists, the Council of State has considered the inconvenience sufficiently serious to the public health and the general interest to call for the suppression of establishments that had been authorized.

On the health of the workmen employed on mother-of-pearl shells, buttons, and fans.

The shells of nacre, or mother-of-pearl, serve for the manufacture of a number of objects of utility and luxury, such as buttons, double and simple, fans, accordion notes, and many fine objects for the table.

This employment is very widely spread, particularly in England, Germany, and Holland, where it occupies a very considerable number of artizans; in France it is carried on only in Paris and some few departments. In the department of Oise, however, several thousand men, women, and children are employed in it.

The pearl shells employed in this work are of three varieties, called in commerce mother-of-pearl, from China, bastard mother-of-pearl, from the Red Sea or Egypt, and lastly, that from Panama. The first variety bears the highest price, especially for fans; the other two are used principally for buttons and objects for table use.

Working these shells into fans and buttons necessitates very different operations, amongst which are some that operate injuriously on the health of the operatives.

To make a fan, a shell must first pass through the hands of the sawyer, then successively through those of the "émeuleur," the dresser, the fashioner, the engraver, the cutter, and sometimes through those of the gilder.

To become buttons, the shell passes through the hands of the cutter, the scaler, the turner, the "émeuleur," and the piercer.

Each workman has his own special work, and is constantly employed on the same kind of work.

Of all these works, the operatives only complain of the sawing, the grinding (émeuleur), and the work "au tour," *i.e.*, the turner's work. These are, in effect, those which present the greatest inconveniences for the health of the workmen.

The *sawing* necessitates a considerable expense of muscular force, a permanent vertical position, and a continual movement of the body on the part of the workmen so as to saw the pearl shell fixed in a vice. In addition, the sawyer constantly breathes a considerable quantity of dust, which each cut with the saw causes to fly towards his face.

The second operation, called émeulage, or working at the grindstone, consists in polishing that portion of the shell sawn off, on the mill. The mills employed are of the diameter of $\frac{4}{10}$ or $\frac{5}{10}$ of a metre; they are raised on buckets half full of water, the grindstone dipping a third of its diameter in it. The grinder, placed in front of the stone, puts it into motion by means of a pedal; he places on the surface the object to be ground, which he holds firmly in pressing strongly, sometimes with one hand, sometimes with both at once. These inconveniences M. Jorrand sums up to be: *standing always on the same foot; continual movement with the other; continued efforts of pressure*, except the interruptions necessary for the inspection of the article, and for changing the object to be ground; *heat of body, resulting from fatigue and continuity of work; icy coldness of the hands, which are always wet; together with incessant respiration of watery vapour, mixed with dust.*

Engraving, cutting, and fashioning likewise disengage much dust, but in smaller quantities, and in a way less injurious to the workmen than the other kinds of work.

To cut the buttons, the tower in the air is made use of. A horizontal tree is put in rotation by a wheel moved by a pedal; the free extremity of the tree is armed with a *fraise*, or little circular saw, of the diameter of the button required, and resembling the crown of a trephine. *This work*, says M. Jorrand, *is extremely fatiguing, and requires force. The workman bends forcibly the elbows, and leans forward the upper part of the body, which causes his mouth to be in front of a thick cloud of dust of mother-of-pearl raised by the round saw or fraise.*

The above are the occupations which in the manufacture of objects of mother-of-pearl more particularly affect the health.

The disengagement of dust and working at the grindstone are therefore the two great causes of the maladies which may affect the workmen.

This dust, of a yellowish white colour, is exceedingly abundant; it is very light, and composed of small grains, excessively thin, which give to the touch a rough and sandy sensation. As soon as one enters a workshop where five or six cutters are working, you are suffocated by this dust, and feel a slight smell of animal matter. This odour is due to the composition of the shells, which enclose an organic animal matter, more or less abundant, according to the age of the mollusc, &c. The fibrous and nacreous structure is that part which generally contains most animal matter, and consequently gives off most of the dust. This explains how it is that the water in which the grindstone bathes becomes so quickly putrid, and renders the work of the mill still more insalubrious.

Chronic bronchitis, hemoptysis, ophthalmia, and cracks in the hands are the maladies which particularly affect the workmen. The thin and abundant dust which escapes from the shell when being sawn, and while being worked on the mill or stone, evidently causes these affections of the organs of respiration and sight. Completely inert, this dust enters into the ramifications of the bronchi, but seldom into the smallest of them, and produces in them an irritation which augments the mucous secretion; the mucous membranes thicken, and cause, especially in the morning, and sometimes during work, a very exhausting cough, followed by considerable expectoration. Chronic bronchitis, frequently complicated with hemoptysis, and still more frequently with pulmonary emphysema, quickly ensues.

The women, who are mostly employed in engraving fans, and placing the buttons on cards, suffer much from chlorosis and similar anæmic complaints, but this depends much on their bad sanitary state, and on the sedentary nature of their employment.

The workmen do not appear to be more subject to phthisis than others, but they are very liable to chronic troublesome asthma, which does not leave them even after their change of employment.

Most of them are not sober, taking a considerable amount of spirits.

The best way to diminish the amount of mischief caused by the inhalation by the mouth and eyes of so much of this sharp dust is to cause currents of warm air to be directed strongly through the workshops of the turners and those who work at the mills and grindstones, and to cause the sawyers to work under a shed, but in the open air. The number of men working in the same chamber should be very limited.

The water in which the stones dip should be frequently renewed, indeed daily, so that the grinder shall not constantly have his hands wetted with stagnant water, and the face continually plunged in a cloud of infected vapour.

The use of masks of very fine silk, recommended and employed in several analogous works, will be very useful to the artizans.

On the laws regulating cowkeeping, &c., in Paris.

The establishments for keeping milch cows, goats, asses, and at former times, pigs, poultry, and rabbits, in towns containing more than 5,000 inhabitants, are looked upon as inconvenient establishments, and placed in the third class. They have continued, especially in Paris, to be objects of assiduous surveillance, which is not only justified from reasons of public health, and of convenience to the neighbourhood, but which is imperiously commanded by a more considerable interest, the health of the animals themselves, and consequently, the good quality of their alimentary products. It is on this account that the Council of Salubrity of the Seine has frequently had to occupy itself with the numerous cowkeeping establishments spread over the town, the faubourgs and the suburbs.

This branch of industry, regularly looked after by the administration, has arrived, in regard to the public health, at a point to leave almost nothing to desire for the good condition of the stables, and the free escape of the waters.

The complaints against this sort of establishments become each day more infrequent; but some few still are deficient in their arrangements, and the milk furnished from these partakes of the faults of the stables.

Thus, they place sometimes in stables far too small such a number of cows as ought not to be admitted even into much larger stables. It is easy to conceive, therefore, that cows which never leave the cloaca where they are placed, breathing only an impure atmosphere, often badly fed, and still worse attended to, cannot furnish milk of good quality. To obviate this grave inconvenience, the Council of the Seine has thought that it should encourage the formation in Paris of larger and more numerous "vacheries," and submit all those that exist in the rural communes of the department to the surveillance that the administration exercises over those in Paris itself.

The old ordonnance of police on these establishments having been submitted to the revision of this Council, its different articles were examined with great care; the measures prescribed for cleanliness appeared satisfactory; but it did not equally approve of the dispositions relative to the dimensions of the stables, the influence of which on the health of the cattle, and consequently on the nature of the milk furnished by them, is incontestable.

Thus, experience has shown that all that was ordered for the aeration and the ventilation of the stables, was rendered completely useless by the keeper, who, knowing that heat favours the development of milk, shuts, as he chooses, all the apertures through which air could enter; so that the cattle fixed in one spot, lived in a species of stove, where they breathed only hot air more or less altered in its composition, and infected by putrid miasmata.

This accumulation of heat, the deficiency of ventilation in the stables, and the sedentary lives towhich the cows were submitted, gave rise to the development of frequent maladies, amongst which

should be reckoned in the first rank pulmonary consumption, and acute and chronic inflammation of the lungs.

To obviate, as completely as possible, so serious an inconvenience, the Council has decided that it would only authorize the establishment of *vacheries* in very open and spacious localities, at the same time, fixing in an invariable manner, the number of cows permitted to be kept there.

Therefore, it proposed to exact, in future, the following conditions:—

1st. The stables for cows not to be less than 4 metres in height.

2d. The stables for one row of cows not to be less than 4 metres in breadth from the manger to the opposite wall.

3d. The stables for two rows of cows not to be less than 7 metres in width, from one manger to the other, if the mangers are placed against the walls; and not less than 8 metres if the mangers are placed in the centre of the stables.

4th. The space reserved for each cow not to be less than 2 metres in breadth.

Lastly, the Council has decided that it was necessary to determine positively that no cow establishment situated lower than the surrounding soil should be authorized, and that authorization should always be refused when it is sought for in a locality where the waters which drain from the stables are to be received into cesspools.

These wise regulations have been confirmed by the ordonnance of police of 27th February 1838, which has completed those of the 12th June 1802, and 25th July 1822.

Ordonnance No. 1,646.

Paris, 27th February 1838.

We, Prefect of Police, ordain:

1. In future no cow-keeping establishment to be opened in Paris, except in localities situated between the surrounding walls and the lines directly to be mentioned, namely:

On the left side of the Seine.

The esplanade and the Boulevard des Invalides; the Boulevard of Mont Parnasse, &c. &c.

On the right side of the Seine.

The Allée des Veuves; the Streets d'Angoulême, Pepinière, Saint Lazare, Coquenard, Montholon, &c., &c.

2. The stables to be paved sloping; they must be provided with a stream of water, to facilitate the running away of the liquids.

3. The purveyors to cause the dung to be removed at least once a week, before 6 a.m. in summer, and 8 a.m. in winter.

4. The flooring of the stables to be made a smooth surface.

5. The forage stores to be separated from the stables by a wall in masonry, if they are placed on one side, and by an area pugged with plaster or brick pavement, if the stores are above the stables; in no case can any grate, stove, or fire-place be erected in the store-rooms of the forage.

6. The purveyors to keep the cows in the most perfect state of cleanliness; they are to conform to all the precautions for salubrity prescribed by the permission with which they must be provided, conformably to the regulations for dangerous, insalubrious, or inconvenient establishments.

7. The purveyors are expressly prohibited from placing malt in any cellar under any pretext whatever.

They may only deposit malt in excavations constructed on purpose, under sheds provided with skylights, and in well-lighted places.

These places for depositing malt may only be used after direct permission of the administration.

They must remain constantly open; the malt alone may be covered over with straw or some other substance for preserving it in good condition.

8. The ordonnance of police of the 25th July 1822 is repealed.

G. Delessert.

On the physical changes produced on the limbs of bleachers of wool.

In the manufactories where tissues of wool are bleached by means of the vapour of sulphur, as in that of M. Vérité, at Courbevoie, near Paris, the workmen employed in drawing out the pieces which roll from between the cylinders, have their hands in a peculiar condition.

The skin first becomes softened by the frequent contact of sulphurous acid; the epidermis, completely blanched, is wrinkled, upraised, and destroyed in places. This disposition is most particularly marked on the thumb and index finger, because these are the two fingers which seize and stretch the material.

It is seen on both hands to an equal degree, because the workman uses both equally, in order that those fingers of the right hand may not be too deeply and severely injured.

On the Police laws regulating the trade of bakers in France.

In France, for a long series of years, regulating the commerce of bread has excited the solicitude of the Government, which has endeavoured to ensure the constant sale of bread at a moderate price, by subjecting this branch of commerce to a very strict system, and to a special surveillance.

The end to obtain in this matter is the constant provisioning of every locality, in conjunction with salubrity and unadulterated products. We propose to show by what conditions this result is obtained, or, in other words, what is actually the régime of the bakers' trade, as well in France as in foreign countries.

The freedom of trade, substituted by the revolution of 1789 for the privileges of corporations, extended to bakers as well as other traders. But on the 19th Vendémiaire, year X., the Consular Government, desirous of facilitating the surveillance of the bakers of Paris, some of whom had, under serious considerations, threatened to close their shops or refused to bake the same quantity of bread as heretofore, and anxious to ensure more fully the proper provisioning of the city, published an order which established the following conditions, to be obeyed by all members of that trade:

1st. Obligation to obtain a special provision from the Prefect of Police.

2d. Deposit in a public magazine, of fifteen sacks of flour of the first quality, weighing 159 kilograms.

3d. Private and permanent provision of sixty, thirty, and fifteen sacks, according to the relative business of each baker.

4th. Nomination of four syndics, charged with the surveillance and the administration of the dépôt.

5th. Granting a patent to each baker as an encouragement.

6th. Prohibition to quit the trade without giving six months' notice.

7th. Prohibition to diminish the number of ovens without authority of the Prefect of Police.

8th. Infringement of any of above rules, to cause baker to lose his licence.

9th. The dépôt of guarantee to be forfeited if baker quits his profession without permission.

This order of the year X. has remained the basis of the régime of the bakers in Paris to the present day. It did not limit the number of bakers, which, however, in consequence of the obligations imposed by it, has become gradually reduced and has remained limited, for twenty years past, to 601 establishments actually existing.

Various modifications have been successively introduced into the police laws of the trade; the principal relating to the provisioning.

By the last police regulations (May 1848), the Paris bakers are obliged to keep a total amount of 128,583 quintals of flour of the finest quality.

This corresponds to a consumption of about thirty-two days.

The keeping up a store of flour at their own private shops being very likely to become incomplete, in spite of the surveillance of the authorities, and a delay in the arrival of flour on account either of drought, or of floods, or frost, being liable to cause much mischief, it was thought necessary to guard against such accidents, and such is the object of the Ordonnance of 19th July 1836, which obliges bakers to deliver into a public reservoir which is

loaned to them gratuitously for this purpose, three-fifths of the store of flour which they ought to have constantly in their possession.

Ordonnances of police had introduced many restrictions to the sale of bread in the Paris markets; that of the 19th November 1828, removed the whole of these entirely, and has allowed the bakers both of Paris and the suburbs to bring and sell bread every day, in all the markets, and in any shape they may choose.

Bread is sold there, of similar qualities, $2\frac{1}{2}$ centimes per kilogram under the tariff price, and it has been remarked that this trade, so useful to the poorer part of the population, acquired considerable extension during the high prices of 1847, since the sale of the suburban bakers alone, in the Paris markets, which in 1845 only amounted to 5,760,349 kilograms, were 6,871,425 kilograms in 1846, and in 1847, 8,139,606 kilograms; the amount fell off again in 1848 to 6,286,702 kilograms, and to 6,354,639 kilograms in 1849.

In 1847 there were 42,628 bakers in the whole of France, that is to say, one baker for every 830 inhabitants.

Baking houses do not figure, and properly so too, among the classed establishments, and the influence of the manufacture of bread affects no others than those actually employed. The Council of Salubrity of the Seine, however, has had to consider several questions relating to baking, questions of general interest. It was of importance in the first place to ascertain if the use that the Paris bakers make of leaden cisterns, to preserve the water employed in making bread, could give rise to accidents, and whether the use of these reservoirs should be interdicted, or whether it might be tolerated with certain modifications.

After long continued and decisive experiments, the Council has determined formally that the bakers may be allowed to continue to use leaden cisterns, on condition that they place the tap at a distance of three inches from the bottom of the cistern, in order that the insoluble carbonate, if any be formed, may deposit itself at the bottom, below the tap, and also on condition that they cause the cisterns to be cleaned out once a month. For further security the Council has considered it necessary to require that the sheets of lead which line these reservoirs should be covered with a slight coat of varnish, so as to prevent the contact of the lead and water, and prevent the formation of insoluble carbonate of lead. To apply this wax, it will suffice to warm the lead gently, to rub it rapidly and several times with a piece of wool covered with wax.

The second fact relates to the use of copper scales for weighing the dough with which the bread is made. A report of the inspector of bakers of Paris has caused it to be known that in 559 out of the 601 baking houses that exist in Paris, they employ copper scales to weigh the dough, and that these scales, instead of being cleaned with linen, as might be supposed, are cleaned by the chains which suspend them, being used as a brush. The Council saw the danger of this custom. In truth, the dough,

composed of water and flour, and containing, besides, a certain quantity of salt, attaches itself to the plates of the balance, and exercises on the metal a chemical action, resulting in the formation of oxide of copper. This oxide, or the salts of copper so formed, then penetrate the portion of the dough which, later, is detached by the friction of the chains. It is easy to conceive that in this case, oxide of copper may be introduced into the bread, and that it is of importance, in the interest of the public health, to take measures for preventing, either through neglect or imprudence, bread that contains even very small quantities of salts of copper being distributed for consumption. The Council has considered that it would prevent all such danger,—

1st. By obliging bakers to use balances whose scales should be of tin plate;

2d. By ordering the scales to be cleaned by means of a rubber made with tinned iron, and used for this purpose alone;

3d. By obliging them to wash these rubbers with hot water;

4th. By prohibiting bakers from using in their shops utensils of copper, brass, or zinc;

5th. Lastly, by ordering bakers, if it is thought inadvisable to impose on them the execution of the measures indicated by Nos. 1 and 3, to cover solidly with tin the chains and scales of their balances, and their utensils of copper, brass, or zinc.

Two more points deserve all the attention of hygienists and government officers. Generally speaking, the bread is made in cellars, narrow, badly ventilated, and impossible to be kept clean. The walls are frequently in a state of dilapidation which offers shelter to a crowd of insects, which are often found again in the bread. The kneading done by the hands of men, has, besides, something very repugnant. And on these two points it would be very desirable that the influence of authority should hasten to propagate improvements already accomplished in this art.

The profession of baker, known generally as a very unhealthy one, is, however, less so than it has been said to be. The bakers' assistants, divided into "*brigadier*" who shapes and places in the furnace, into "*geindre*" who kneads, and into "*aide*" or assistant, who heats the ovens and helps the principal workmen, are exposed, some to the excessive heat of the furnace, others to the very severe labor of working the dough, and to the dust given off from the flour. The operations of bakers take place at night. And without taking into consideration any influence that a night life may exert on the physical and moral consitution of man, an influence reduced to its just proportions by Mr. Turner Thackrah, we cannot but acknowledge that there are objections to the great changes of temperature, which must be felt after his work at the oven, or after kneading, by the workman who exposes himself to the morning's cold. Rheumatic affections, and acute inflammations of the chest, are in fact, as Ramazzini had already pointed out, those which most frequently attack bakers. In a report of the Institute of Hamburgh, quoted by Thackrah, it is stated that acute rheumatism attacks one sixth of the bakers, while it only shows itself in one fifteenth of the

tailors. Every one also has remarked the pallor so strongly characteristic of baker's journeymen. It must be attributed particularly to that anæmic condition peculiar to all artizans who live in a very hot atmosphere. This influence, in conjunction with the smell given off by heated paste, doubtless contributes to predispose bakers to dyspepsia, which frequently, also, the habits of drunkenness and disorder, well known to be common to them, determine.

The dust of flour which penetrates into the air cells of the workmen, does not exert the disastrous effects which have been assigned to it; and the statistics of M. Benoist de Châteauneuf, and M. Lombard, of Geneva, have demonstrated that this profession is not decimated, as has been stated, by consumption.

The former of these authors has observed, that out of 2,800 bakers deceased in ten years, fifty-seven only died of tuberculous affections. The irritating matters mixed with the flour, such as remains of insects, different pellicles, perhaps also the contact of the yeast, cause a squamous eruption to show itself on the hands, which Ramazzini perhaps had in view in describing the thickening of the hands of bakers, and which is referred by Thackrah to a species of psoriasis. This affection is very distinct from the muscular development caused by the operation of kneading the dough.

These observations on the hygienic influence of the profession of baker, hardly allow us to specify to what special cause was due the frightful mortality which ravaged these artizans in the plague of Venice, according to Mercurialis, and in that of Marseilles, in 1720, which carried them off in mass.

It is difficult not to think that some local influence, or some unperceived coincidence, could alone explain this extraordinary fact. This opinion would be confirmed by the observation of what occurred in the first cholera epidemic in Paris, where the bakers figured only to the number of ninety-six in the table of deaths, a proportion very inferior to that of a number of other professions understood to be much more salubrious than that of which we are now treating. We must also count as due more to imprudence than to the necessities of bakers' work, the possibility of asphyxia, from the vapours of ill-extinguished coke. The most simple precautions will suffice to avoid all accidents of this kind that may have occurred.

Indeed, the greater part of the inconveniences to which bakers are liable, may be removed by putting into general use the improvements lately discovered.

On the diseases of workmen employed in the manufacture of tobacco.

Nicotine is the active principle of tobacco; it appears to exist in it in a state of combination.

Fermented tobacco contains less of it, although it smells more; it is because a portion of the nicotine has been destroyed by the fer-

mentation ; the ammonia which has been developed has set at liberty a part of the nicotine.

The *nicotianine*, according to the observations of Messrs. Henry and Boutron-Charlard, is a species of solid essence, which owes its properties to its mixture with the nicotine. In snuff, the ammonia is in the state of a salt, the nicotine is partly free, partly in the state of a neutral of basic salt ; it is to these two salts that tobacco in powder owes its power of over-exciting the mucous membrane of the nose. The leaves of tobacco yield from 19 to 27 per cent. of ash, which are generally very *siliceous ;* they contain, in addition, carbonates of lime, potass, and soda, and different other salts.

In France, the culture of tobacco is under certain regulations; the annual crops amount to about 16,000,000 of kilograms in the departments of Ille-et-Vilaine, Lot, Lot-et-Garonne, Nord, Pas-de-Calais, &c.

Of all the industrial cultivations, the most general in the Algerian colonies is that of tobacco.

In France, the Government, which possesses the monopoly of tobacco, directs from Paris, by its Director General of Duties, the different manufactories in the kingdom ; this central administration has wished, in the interest of the consumers, as well as to facilitate its own labours, that a uniform mode of fabrication, that which gives the best prepared tobaccos, should be adopted in all the establishments, and it is on this footing that they are formed ; there do exist some differences, but these have no sensible results on the products, they arise from the peculiar ideas of the chiefs of the establishments ; but among these differences there are some which may exercise some influence on the health of the workmen, and which it is important to know.

To respond to the ever-increasing wants of the consumers, ten great manufactories are constantly occupied in the manufacture of tobacco ; they are situated in the following towns :—Paris, Lille, Strasburg, Lyons, Marseilles, Toulouse, Tonniens, Bordeaux, Morlaix. In some of these tobacco is manufactured in all its forms; in the others, they only make cigars, or what are called " Carottes," " rolls."

This difference should be noted, because it has an important bearing on the health of the workmen.

Medical men are attached to these factories ; their institution goes back to the earliest times of the monopoly, that is to say, 1811. For a long time their duties consisted merely in visiting the workmen, either at their entrance into the works, in order to certify as to their health, and to put aside those in ill health and those labouring under contagious diseases, or during their sojourn in the factories, to give them advice and attention. At the present time, the mission of these physicians is more extended. The administration has increased it by requiring them to transmit, in detailed reports, annually, the remarks which they may have made upon the health of the workmen, upon the maladies observed in the manufactories, and on the peculiarities which these maladies may have presented ; a most excellent measure, which bears witness to

the zeal of the administration for the interests confided to it, and which should be adopted in all establishments which occupy a number of workmen.

This would be the best means of uniting, as to the influence of employments, precise information, information that the science of Hygiène would know how to profit by, and that the legislator himself might usefully consult.

But a short time has elapsed since observations have thus been demanded from the physicians of the tobacco manufactures, and already the collection of their reports present a high interest. M. the Viscount Simeon, director-general of the administration of tobaccos, has drawn up, in a short work, the information furnished by the physician in the course of the year 1842. The principal questions therein examined are three:—

1st. The workshops and their conditions.

2d. The diseases and accidents met with during the year.

3d. The effects of the tobacco on the health of the workmen.

According to the observations made by all the medical attendants, tobacco appears but rarely to produce sensible effects on the workmen, even at the commencement of their work.

There are only two work-rooms, that of the fermentation of the masses intended for the fabrication of the tobacco in powder, and that of the drying of the "scaferlati," in which the emanations of the tobacco have appeared to exercise any real and durable impression on some very nervous subjects. But the cases are few, and as a whole, the manufacture of tobacco is not injurious to those who work at it. The action that the emanations have exercised on some individuals, develops phenomena more or less intense, but entirely analogous to those produced by an excess in using this substance. Some of the medical attendants assert that the manufacture of tobacco is not only not injurious to the men, but that it even prevents phthisis and other diseases of the chest.

Dr. Melier, who has lately investigated this subject with the greatest care and attention, states that fresh workmen have always some difficulty in accustoming themselves to the atmosphere of the workshops, charged as it is with particles of the tobacco. He states that they experience the following symptoms in general:— a more or less severe headache, accompanied with sickness and nausea; they lose their appetite and sleep, and many of them suffer from diarrhœa.

These effects are more constant with the females than the males, but the former are more in number than the latter; in Paris there being 800 women employed to 500 men.

This sort of acclimatisation for the new workers is always more difficult in summer than in winter, and the hotter the season the more it is painful and long, the heat always augmenting the effects of the tobacco, as Ramazzini had before remarked. Once the first difficulties surmounted, the workmen become habituated to the work and cease complaining; indeed, it seems as if they do not perceive the emanations that surround them. They even appear to like to sleep on tobacco leaves, and the belief is extremely

general among them that the manufacture is favourable to rheumatic pains.

Certain workmen, however, experience a considerable change, which deserves attentive study. It consists in a particular alteration of the complexion. It is not a simple discoloration, an ordinary paleness, it is a grey aspect, with a wan dull appearance, a mixed shade between chlorosis and certain cachetic diseases. The physiognomy receives from it a peculiar character, which an eye accustomed to see these cases can recognise immediately as occurring only to tobacco workmen. This *facies* is only observed among those that have been long at work at tobacco. Dr. Hurteaux states that it requires at least two years to acquire this countenance. The preparations of iron remedy this condition of things, and restore to the men their original tint.

The diarrhœa so often brought on at the commencement of this work, requires no special remedy, as it is at the same time a sympton and a remedy of the evil.

Remedies.

The best methods of remedying the injurious effects which may be caused by the emanations arising from tobacco manufactures appear to be:—

1st. To use that mode of fabrication which causes the least disengagement of dust.

2d. To facilitate, by physical means, the exit from the establishment of the dust which is in the air.

3d. Lastly, not to employ individuals of weak or nervous constitution.

The first end will be attained by causing the tobacco to be worked in a *moist* state; the dryer it is the more dust will be produced. In the month of August 1827, the tobacco was delivered to the workmen of Lyons in a much less moist state than usual; many of them fell ill, and declared that their indisposition was due to this circumstance.

The second end, that of favoring the carrying away of the tobacco dust from the work-rooms, will be secured by the following means:—In the first place, the work-rooms must be large in proportion to the number of men that they are meant to contain, that they must be open from the north to the south, in order that by simple currents of air they may be swept from the dust which collects everywhere, and which would remain there indefinitely, if great care was not taken. This ventilation should be made in the absence of the workmen, and renewed twice a-day; the windows of the work-rooms should be very large, and should reach from the ceiling to the floor. Lastly, the exit of the dust will be much favored in rooms where it is very abundant, by constructing draft furnaces.

It must be owned that the Administration spares nothing in what may concern the interests of the workmen, and it thus succeeds gradually in alleviating the inconveniences to which they are

exposed. For this reason, when M. Chevallier pointed out the danger of using lead to envelope the tobacco, tinfoil was forthwith ordered to be used instead, although this apparently simple change caused a considerable increase in expense.

Tobacco is constantly adulterated with many noxious ingredients, some of which are used to colour false ingredients. Among other substances the following have been detected:—marine salt, sal ammoniac, potass, saltpetre, cream of tartar, honey, treacle, sulphate of copper, sulphate of iron, animal black, sand, alum, fine sawdust, tan, ivory black, dried earth, dried dung, red lead, orpiment, cinnabar, and sulphuret of antimony.

On the health of the workmen employed in the manufacture of sulphate of quinine.

The preparation of sulphate of quinine has quite recently been the object of very interesting observation, in a hygienic point of view, on the part of M. Chevallier, who has rightly considered that this kind of work, known only the last thirty years, might be the occasion of certain special accidents. On this subject he made numerous researches, and with the assistance of evidence obtained by himself, as well as from correspondents in England and Germany, from the most important manufacturers of sulphate of quinine, he has arrived at the following conclusions:—

The artisans who work at the fabrication of the sulphate of quinine, are exposed to be attacked by a disease of the skin, which obliges them to suspend their work during a fortnight, a month, or longer.

There are some workmen who cannot resume this work, and who are forced to quit the establishments where they have been employed. M. Zimmer, a manufacturer at Frankfort, has found that the workmen who were occupied in powdering the quinquina in his works, were attacked with a peculiar fever, which he designates by the name of "Quinquina fever."

This disease is so painful, that those workmen who have suffered from it have refused to powder the quinquina, and have preferred quitting the establishment. This complaint has not yet been observed in France. No prophylactic means are known at present for preventing the skin disease. It attacks, however, not only the workmen who are actually employed in various operations connected with the manufacture of the quinine, but also those persons who come into contact with the emanations of the manufactory.

It attacks those workmen who are sober, equally with those who give way to excesses.

It has not been shown that there are any causes that predispose the workmen to be attacked by this disease, although several persons admit predisposing causes.

Although the memoir of M. Chevallier contains an *imposing number* of cases, it has not completely convinced us.

This savant deserves much praise for having directed attention to a question interesting to the health of quinine workmen; but the greater portion of the facts, which may have some value, emanate in general from persons who are not medical men, as directors of factories or manufacturers themselves. Thus Mr. Henry writes:—

"I know that the little *scraps* of the barks of calysaya are capable of determining irritations in the dermis and of causing some inconveniences; but I do not think that they are of the same nature as those remarked in the disease which occupies your attention. This complaint, of which, for my part, I have never had the slightest attack, although I have lived and worked a long time in manufactories of sulphate of quinine, mostly attacks scrophulous or very lymphatic individuals; it attacks the men who boil the bark at least as much, and more than those who reduce it to powder, and it attacks those who bottle the sulphate."

However it may be, the principal accidents which may arise from the fabrication of sulphate of quinine, consist in a fever more or less severe, and an exanthem. The fact of this fever arising from the manufacture is certainly proved, but we do not think that that is the case with the exanthem.

Nevertheless, we will add that now that public attention has been called to this point, further observation will demonstrate or invalidate the facts newly studied by our learned colleague.

On the health of the workmen employed in cotton factories in France.

The Academy of Moral and Political Sciences of the Institute of France, charged M. Benoiston de Châteauneuf and M. le Docteur Villermé to make a series of researches into political and statistical economy in the departments of France, with the view to show, as minutely as possible, the physical and moral condition of the working classes.

The reports on the workmen in cotton, silk, and wool, are those of M. le Docteur Villermé.

Cotton.

One of the most insalubrious parts of cotton factories is that where the beating of the raw cotton takes place. This operation, whether done by hand or machine, produces a thick cloud of irritating dust and of cottony down, which is deposited upon the workmen, dirties them, attaches itself to their woollen clothes, to their hair, their eyebrows, their eyelids, the entrances of their ears, to the nostrils, their beard, wherever hair can retain it, and give them, during their work, a strange aspect.

It finds its way into the nose, mouth, and throat; and also into the minute ramifications of the air tubes.

This down, or dust, that the beaters raise and inhale in such large quantities, can but exert a most deleterious influence on

their health. It is a point on which there is no dispute in any of the places where cotton is spun.

Not only do the workmen themselves complain of it, but also the foremen, sometimes even the masters, and always the medical men.

This insalubrity is so generally recognized, that in many mills, especially in those of Alsace, where the beating is performed by machinery and employs consequently but few men, the workmen in the carding rooms are successively and in turns employed in looking after the beating, like soldiers mounting guard.

Whether it is the dust in the raw cotton or the down itself which ruins the health of the workmen employed in the beating, it is quite undoubted that their death is certain, proved ; that they complain of dryness of the mouth and of the throat, and are seized after a short time, sometimes in a few days, with a cough which becomes more and more troublesome.

I have, nevertheless, seen in some beating rooms, men in good health, who assured me that they could work there several years consecutively without suffering. It is to be remembered, however, that they received very high wages, either directly from the manufacturer or through a small contribution raised on the salaries of their numerous fellow workmen employed in carding, which contribution exempted them from taking their turns in the beating department.

The cough is the first symptom of a slow and formidable disease of the chest, which is always relieved by simple cessation of this kind of work, and which at the commencement is cured by abandoning altogether the beating room.

I have seen workmen who have in this manner suspended and resumed the cough. This disease takes on, during its development, the appearance of consumption, and the physicians of the countries where the cotton mills exist, call it "cotton phthisis," and some "cotton pneumonia." These names are significant. The victims frequently go to the hospital to die, but I have been unable to ascertain the proportion of such. It is especially the women, children, and young persons who thus die, because beating by machinery not requiring muscular efforts, full grown men are never employed at it. When the cotton is beaten by hand or by sticks this is different.

Formerly there was no other means of beating cotton but this latter. But at the present time, in all the mills where they do not manufacture the finest threads (and they are the greater number) machinery has been substituted.

The invention of these machines and their application to the manufactures of cotton and woollen materials, especially the latter, have been a great benefit to the workmen, and the cause of great saving to the manufacturer; for they have permitted, in the greater number of the factories, the suppression of the hand-pickers, of whom there were great numbers, and to diminish, in a very large proportion, the number of workmen employed in the beating.

In order to appreciate this benefit, one should see, in the establishments where cotton is still beaten by sticks, the fatigue of the wretches doomed to this operation. It is much to be regretted, however, that up to the present time (1840) it has not been possible to construct a machine fit for opening and cleaning all kinds of cotton, and that it is always necessary, for fine spinning, to pick and beat by hand.

Insalubrity of the same nature as that caused by the beating, but in a far less degree, menaces the workmen charged with the early operations connected with carding.

This is not the case, however, with the subsequent operations.

It appears easy, at first sight, to remove from this dangerous influence those who are exposed to it, by means of a gauze mask on which the dust and the down suspended in the air might deposit itself at each inspiration. But this deposit would render such a mask more and more impermeable to air, would oblige the workmen to make considerable efforts to breathe, so that in a short time he would throw it aside, and it would not be possible to prevail on him to take to it again.

Very lately the machines for beating and cleaning cotton have been modified so as to work without raising so large an amount of dust and down. I saw at Zurich, at the mills of M. Escher, a work-room of ventilating beaters so modified. To my great astonishment, the face and clothing of the workmen bore scarcely any traces of their occupation, notwithstanding that all the windows of the hall were open. Till that time I had always seen the contrary.

The most unwholesome operation in connexion with the cotton manufacture was thus made healthy. This result ought to cause the universal adoption of that machine. Indeed it is adopted in Alsace, but in no other part of France or in Belgium.

Another cause of insalubrity in cotton mills, but one which acts in a less injurious degree than the preceding, is the high temperature that it is necessary to keep up in several works.

For the carding a temperature of about 60° Fahrenheit is enough.

The spinning requires a higher temperature for the finer threads; without that they would break every instant. A temperature of about 60° or 62° Fahr. is required for the coarser threads; of from 67° to 70° for the middle sizes; and from 75° to 77° for the finest. These high temperatures are as necessary as the absence of every current of air.

The works for printing Indian handkerchiefs, and those for drying the cotton, require to be kept equally warm.

Lastly, the temperature is commonly from 100° to 104° where they dress the cotton by machinery, and from 93° to 104° where certain other operations are carried on.

One must remain for a time in the different rooms where these high temperatures exist to know what amount of inconvenience is experienced there; the workmen, arms, feet, and legs naked, and with but little other clothing on, are constantly in a state of abun-

dant perspiration. It is easily understood, therefore, how easily accidents to health arise, especially in winter.

The women, employed in what is called the "Scotch" department, the hottest of all, appear paler than the others. But if I may believe the proprietor of one establishment, where I saw fifty of these women in one apartment, the only inconvenience they experience is a kind of erysipelas, which develops itself at the bend of the thigh, especially in the stoutest, and frequently obliges them to desist from their employment. But, according to the managers of two other similar establishments, many of the women are obliged to abandon the work altogether; and if nearly all of them are between 16 and 25, or 30 years of age at the most, it is partly because the young support this great heat better. On the other side, the physicians of Mulhousen, Thann, Tararc, Saint Quentin, Rouen, &c., agree in asserting that the women in question are oftener than the others attacked with colds and severe inflammation of the chest, in consequence of the sudden changes of temperature to which they are exposed. The drying rooms of these establishments are sometimes heated to a temperature of 122° Fahrenheit, but there are few workmen at a time in those rooms, and they remain there but a short time.

A temperature of above 122° may appear surprising, but Dr. Ure, in his Philosophy of Manufactures, says that there are stoves in some of the works which give off a heat of from 140° to 150° Fahrenheit, that is 30° or 40° higher than the temperature of the human body; and he adds, that the workmen, exposed alternate days and in all seasons to so great a heat and to the open air, find in these hot rooms a remedy against the colds which attack them, are in as good health as the others, and are received as members of benefit societies, a proof that their work is not considered unhealthy.

Two kinds of workmen in the cotton mills demand a more particular mention; they are the *fleecers*, and the *sharpeners of the carding machines*, or rather of their points.

Both of these, especially the latter, are said to pursue an occupation very noxious to their health; opinion is unanimous on this point everywhere.

The danger arises from the great bodily exertions they use, and the dust they inhale. The former suffer just as the cotton beaters do, while the latter are injured from the same causes as the polishers of steel.

These are both diseases of the chest, and principally consumption.

It is therefore highly desirable that the fleecing and the sharpening by hand should be displaced by machinery, or at any rate that some amelioration in these operations be introduced.

The beating cotton is therefore the most dangerous employment for the number of persons employed.

On the plantation of trees in the interior of towns.

It is an opinion generally admitted that the planting of trees contributes equally to the embellishment, the charm, and the healthiness of towns. This opinion appears to be solidly founded, as to the question of health, on incontestable facts of vegetable physiology.

This opinion, however, requires to be received with certain modifications, as, unless these plantations are made under certain ascertained regulations, more mischief than benefit will arise from this practice.

After going into many details and discussing many questions connected with the physiology of plants, Dr. Jeannet, of Lisle, sums up with the following

Conclusion and propositions.

1. The plantation of trees in the interior of towns does *not* produce any appreciable improvement of public health. There exists too great a disproportion between the production of carbonic acid resulting from a city life, and the atmospheric purification resulting from the respiration of some thousands of trees planted in the principal streets.

2. *Large trees* planted *too near* houses are a powerful cause of insalubrity. They render the atmosphere in their neighbourhood humid, because their transpiration pours out into the air enormous quantities of water; because they retain the rain waters, which, instead of running rapidly on to the surface of the soil, evaporate gradually in the atmosphere; because they determine during the night the precipitation of the atmospheric humidity under the form of a fine shower; and because this shower, with which they are covered as if it had been raining, returns into the atmosphere in the state of vapour during the day.

Moreover, trees are injurious to the free circulation of air, and they intercept light and heat. This is a very serious inconvenience in the interior of towns, where all the efforts of public administration should tend to favour the penetration of air, heat, and light, even into the lowest habitations and the most remote corners.

For air, light, and heat being the chemical and physical promoters of organization, are at the same time the only true agents of the salubrity of dwellings.

3. Trees planted in the principal thoroughfares as pursued in some of our towns produce only a questionable embellishment; they are in unfavourable conditions for vegetating vigorously; the plantation is continually disfigured by the disease or natural death of a great number of members.

4. Inasmuch as trees are a delightful object at a certain distance from houses, *when they do not cast their shadows on them*, in so much do they become inconvenient and injurious, as a general rule, when they are near enough to intercept the sun's rays.

They must be considered as noxious when their distance from the houses does not exceed their height.

5. The following system which I propose will reconcile the interest of the public health with the pleasure of the inhabitants and the decoration of the towns.

Those streets having not less than 25 or 30 metres in breadth must alone be planted with trees. In these streets, the trees will form in the middle of the space existing between the houses an avenue 6 *metres broad only.*

The trees should be cut away at the height of about 7 or 8 metres; their side branches should be cut away so as to prevent their extending too far, without causing them to become straight lines.

In the streets of 30 or 40 metres in width, like the Boulevards of Paris, the trees should never be planted nearer than 10 metres to the houses; only one row should be planted on each side, and the lateral branches should be directed towards the centre of the street.

Thus the houses should be 10 or 12 metres from the trees; these, being only 7 or 8 metres high, would rarely shade the ground floors, but always the foot-paths.

As to the large spaces, like the quais, the squares, open spaces, &c., I would propose to plant them with trees allowed to grow into their most majestic beauty, compatible with their not being too near to habitations.

I do not think that the lime and the ash trees generally adopted in most places, offer to a sufficient degree the conditions that are desirable for the decorations of towns, viz., a thick foliage, a rapid growth, robust health, and a tap root.

On the best means of ensuring the salubrity of towns.

M. E. Chevreul, in a paper read before the Academy of Sciences of Paris, stated that he had proved by direct experiment that wherever there existed alkaline sulphates, together with certain organic matter, in a body of water out of contact of air, a sulphuret is of necessity formed, and that he thus explained the pollution of the waters of the Paris basin, which contain sulphate of lime, as well as of the water kept in oaken barrels for the use of sailors, and the infection of sea water that had penetrated the hold of a ship.

From the decomposition of organic matter, and its accumulation in the soil of populous cities, is derived the cause of the insalubrity and even of the poison that this soil, and the waters of the wells sunk in it, may show after the lapse of a certain time, when the ground, being permeable, is not capable of being always cleansed *per descensum.*

Animal remains buried in the earth, matters escaping from water-closets, privies, and cesspools, organic matter from houses which penetrates the soil, liquids formed in gas pipes by condensation, and escaping therefrom by cracks or badly formed joints, these are some of the causes which give rise to the changeable organic matter which helps to carry insalubrity and infection into the strata which they penetrate.

To this we must add the tendency of a porous calcareous soil to produce nitrates of potass, of magnesia, and especially of lime, under favourable conditions, and a certain proportion of sulphate of lime being present, we shall have all the substances which will produce, with the organic matters, the effects of sickness and disease which would not take place without their presence and intervention. It is particularly the sulphate of lime which gives to the soil of Paris a strongly marked character of insalubrity or infection, which is not remarked in towns whose soil and water are not provided with this salt.

The means to be employed to assure the salubrity of towns are, the one *preventive* only, the others *capable of preventing the insalubrity, and of combating it if it shows itself.*

The *preventive measures* consist in diminishing as much as possible the quantity of organic matter which enters the soil. Such are the establishment of cemeteries and receptacles for sewage at a distance from the towns; the establishment of paved water-closets; incessant washing by means of fountains and water-conduits in the streets; numerous drains and sewers, into which will empty themselves the conduits for water and gas.

The means of preventing the insalubrity and combating it if it exists, are not numerous.

The first of these consists in bringing atmospheric oxygen and light, wherever organic matter susceptible of becoming unwholesome by a commencement of decomposition, exists. The reason for this prescription is the tendency of oxygen to convert definitively all organic matter into water, carbonic acid, and nitrogen, by slow combustion—products perfectly innocuous to the animal economy; and the influence of light is favourable to this tendency. One consequence of this prescription is great breadth of the streets, and a sufficient extent of the court yards of houses, so that air and light may freely penetrate them.

A second mode exists, when wells are sufficiently numerous, and placed in conditions such that the water in them is frequently renewed, because there is a constant demand for that liquid, either for daily domestic use, or to purify the soil from the matters that the water dissolves. In addition to this, wells may be considered as tending to the purification of the water that they have received from the soil, since it is there more exposed to the action of the oxygen of the air than it was while in the strata of the earth, and this contact is a cause of salubrity. But if, on principle, this influence on health is accorded to wells, we are obliged, unhappily, to own that, as we find them at the present time, in populous towns, where the soil is polluted, their real efficacy is, to say the least, extremely limited.

These are the reasons which have caused M. Chevreul to attach so great an importance to a third method of purifying towns, a method, in some sort the only one which we are now able to employ actively on the soils which are not in a condition to be incessantly washed by masses of water which act *per descensum*, or which introduce themselves as if they formed part of a great stream, on account of the permeability of the soil. This method consists in

making numerous plantations in the interiors of the towns. The great influence of trees on the health of towns is incontestable, since they only increase in size by robbing the soil of decomposable matters, proximate or ultimate causes of infection. But it is necessary to make plantations with judgment, both as to their number, their situations in the town, and the precautions to take, so that the roots can, while extending sufficiently, satisfy the wants of the development of the species planted, without being liable to reach an already infected soil, where the oxygen of the atmosphere cannot gain access.

On the manufacture of white lead and shot.

In commencing a report on the hygienic questions connected with the effects of lead on the health of man, there is one dominant point that must never for an instant be lost sight of. It is that this metal, in all its forms, and under all conditions, is a poison; a poison the more terrible that its action is slow and insidious.

And parallel with this fact is another, the multiplicity of uses to which the various preparations of lead are applied, in the arts, manufactures, and domestic economy. Some of the compounds of lead are considered impossible to be replaced by any other material. It does not follow, however, that it is not our duty, by every means in our power, to endeavour to substitute for substances extremely dangerous, other materials which are innocuous to health, and that we should not look upon every progressive step made in this direction as a true service rendered to humanity.

While waiting a result that science will be nearly certain in process of time to accomplish, it is of importance to point out, in as clear a manner as possible, all the circumstances in which lead may exercise its deleterious action, and to pass in review the numerous occupations exposed to its influence.

It should be remarked, however, that numerous ameliorations have, of late, been introduced, and that the victims of poisoning by lead are far less numerous than they were in times but lately passed.

Influence of lead on health.

The action of the preparations of lead on the human frame is shown in a more or less rapid manner.

Sometimes a few days suffice to show the effects, but more generally it is only after two or several months' sojourn in an atmosphere vitiated by saturnine emanations that the first symptoms appear.

Indeed, for the greater part of the time, there is observed, during a period shorter or longer, certain phenomena which indicate that the lead is acting slightly on the system.

Thus, sometimes at the end of two or three weeks at most, individuals placed in conditions where the absorption of the poison is very active, become pale and thin; their flesh becomes flabby;

the skin, especially that of the face, takes on a pale yellowish tint, slightly jaundiced, in which the sclerotic membrane of the eye participates, and which coincides with a deep yellow colour of the urine.

The strength diminishes. Many persons have a sweetish or styptic taste in the mouth; their breath gives off a smell of peculiar fetor, as if there were sordes. Though the gums are generally firm, they sometimes bleed, and there is ptyalism. The edges of the gums present a bluish-grey colour, which sometimes extends to the teeth. These phenomena continue during a variable time without interfering very seriously with health, until the more severe symptoms of poisoning manifest themselves.

Most generally these commence by colic. But sometimes it is by neuralgic pains in the limbs, or even by cerebral symptoms, and especially by epileptiform convulsions, by a comatose attack, or delirium, that the invasion of the mischief is characterized. In some rare cases, amaurosis, vertigo, or continual headache present themselves. But it is matter of observation that in almost all the cases of poisoning by lead, an anesthesia, banishing all sense of pain, either in the entire body or parts of it, especially the arms and forearms, is seen.

After this the disease becomes more fully developed, and displays its well known severe symptoms.

Manufacture of shot.

In making shot for sporting purposes, from $\frac{3}{10}$ to $\frac{8}{10}$ per cent. of arsenic is added to the lead.

The addition of this small quantity of arsenic gives to the lead the property of forming perfectly round pellets. The combination, when fully melted, is poured into a sort of spoon pierced with holes, and lined with scum of lead; it filters through the scum, and falls in drops from a great height, so that they become solid in their fall.

This operation generally takes place in old ruined towers or in wells.

These establishments are classed, but only in the 3d class. They require, nevertheless, great attention, both with respect to the nature of the locality and the danger of fire.

Manufacture of white lead.

It is this branch of industry which is the most active cause of lead poisoning. It is against this branch that all the complaints, all the threats of prohibition, have been directed, which have only been staved off by introducing great improvements in the manufacture.

The number of workmen engaged in this manufacture in France has never been large. In 1836, M. Chevalier reckoned for all France only 450 men thus employed.

The principal localities where such works are established are in the department of the Seine, in the environs of Lille, and at Strasbourg.

Melting.—To each factory is annexed a melting house, in which the lead intended to be carbonated is placed.

Carbonatation.—The formation of the carbonate takes place everywhere now by the Dutch method.

A number of sheets of lead are rolled up, and exposed for two or three months to the action of fumes of vinegar, to the air, to watery vapour and carbonic acid gas, which, aided by a temperature of from 100° to 140°, oxydize the metal, and form a neutral acetate, which the progress of oxidation renders tribasic. This is afterwards decomposed by carbonic acid, forming carbonate of lead. This same action, repeated several times, produces variable quantities of white lead.

The separation of the white lead from the lead which it covers, the reducing this salt to powder, and the sifting, are the most insalubrious parts of the operations.

The workman first detaches the large scales or crusts of white lead, which are but slightly adherent to the lead not acted upon; he takes in his hands the sheets of lead covered with white lead, unrolls those that were placed in the pots, twists them about in different directions, and puts aside the detached crusts. This operation, called in France "*epluchage*," in which the workmen have their hands constantly charged with carbonate of lead, is not, however, the most insalubrious part of the fabrication, because the white lead separates in thick scales, producing but little dust.

The sheets of lead so scaled still retain in different places white lead, which adheres strongly there. The operation of removing the white lead from those parts is known by the name of "*decapage*." It was formerly performed by placing the sheets of lead on stone ends, and beating them with a piece of wood. The white lead then came off, some in scales, some in fine powder, inhaled with the atmosphere by the workmen. This operation was most injurious. The *decapage* is performed at the present time, in most of the factories, by mechanical processes, which injure the health of the artisans much less.

The white lead is then mixed with water and ground in mills, so as to form a soft paste, and made to pass under several millstones. This operation is perfectly inoffensive. The workmen do not touch the paste with their hands.

The soft paste is put into conical earthern pots, and exposed to the action of fire. Much of the water is thus evaporated, and the contraction of the mass of white lead separates it from the inside of the pot, so that it is easily extracted. After being entirely dried by hot air, much of the lead is then sold in that condition, viz., loaves. This does not, therefore, at all undergo the dangerous process of dry powdering.

But the greater part of the white lead in loaves undergoes another powdering, followed by sifting, before being sold for commercial purposes. This grinding is even still performed, in many establishments, by vertical stone mills, turning on horizontal stone tables, and it is afterwards sifted through a fine sieve. The grinding, dry sifting, and subsequently packing it in barrels, by the

above processes, are operations evidently highly insalubrious, on account of the powder which spreads over the workshops.

M. Lefebvre, of Lille, one of the principal manufacturers of white lead, has modified this method of working. Instead of vertical mills working exposed to the air, he employs horizontal mills of white marble, enclosed in metallic drums, perfectly air-tight. The lower mill or stone is motionless, the upper mill makes 260 revolutions per minute. The lead, reduced to powder, is thrown by the centrifugal force to the circumference of the stones; from thence it passes into a strainer enclosed in a closet with double doors, and falls, in the state of powder, into a kind of waggon, capable of holding 2,500 lbs. This waggon is not withdrawn until the powder has entirely subsided.

But the most important progress of all those that have been made in the manufacture of white lead consists in the practice which is now becoming very general, of delivering it mixed with 7 or 8 per cent. of oil.

A diminution of the inconveniences of the latter operations, which are performed entirely in closed boxes, disappearance of the dangers which accompany the packing, the pounding, and of the making into paste by the journeyman painter; such are the principal results of this practice, as fortunate for health as in a commercial point of view.

It is difficult to give an accurate account of the proportion of workmen attacked. It is, however, quite certain that, thanks to the improvements introduced, there are now scarcely any attacks among the men employed in Lille. The witnesses are unanimous on this point, and M. Lefebvre says that he can now actually dispense with a medical man. It is unfortunately not the same in Paris. A great number of workmen there suffer; and, remarkable to relate, it is precisely at Clichy and Ivry, where means reputed to be prophylactic, particularly sulphur baths, sulphur lotions, and change of work, are put into force. Nothing similar is practised at Lille, and at M. Lefevbre's, whatever has been said, the men are neither regularly inspected by a surgeon, nor forced to go to the baths, or to use lotions, or particular beverages. At the very most, they are furnished with blouses for work, and with gloves, which the great majority neglect to use. The daily wages of the men are 2 francs, $1\frac{3}{4}$ francs, and $1\frac{1}{2}$ francs. One fact cannot be passed over in silence, it is the almost constantly renewing of the workmen in the factories in the environs of Paris, so that for one hundred men daily employed, there will have worked during a year some fifteen hundred, whilst in the north, for a second-rate factory, that of M. Lecroart, for example, who employs eighteen workmen, scarcely more than twice that number pass through.

Adjoined is a table giving the number of attacks and deaths from lead affections, taken from the Paris hospitals, for the last 14 years, distinguishing the men from the two factories, from Clichy, where the recent improvements have not been introduced, and from Ivry, where they have. This table comprises also painters and other professions where men have suffered from lead affections.

TABLE showing ATTACKS of LEAD DISEASES in PARIS HOSPITALS during 14 Years.

Years.	Total deaths.	Total attacks.	White Lead Workers.				Painters.	Other Professions.
			Deaths.	Total.	Clichy.	Ivry.		
1839	8	211	7	139	130	7	48	24
1840	10	248	—	152	123	28	47	49
1841	12	302	11	236	161	51	39	27
1842	22	316	18	252	169	53	43	41
1843	9	260	—	204	—	—	45	11
1844	14	325	12	231	159	62	41	53
1845	17	475	13	257	196	29	113	105
1846	13	552	9	355	—	—	133	64
1847	10	425	7	227	180	40	132	66
1848	1	172	—	88	65	22	59	25
1849	1	202	—	118	108	10	38	46
1850	1	238	1	154	134	20	49	35
1851	1	216	—	140	125	—	48	28
1852	1	217	—	—	—	—	—	—
	120	4,159	78	2,553	1,550	322	835	574

However much diminished the dangers arising from the manufacture of white lead may have become, the well-known and constant insalubrity of this industry has not ceased for one moment to be an object of solicitude to men of enlightened minds; and when the discovery of white of zinc showed the possibility of substituting this inert preparation for the very noxious one of white lead, much excitement was produced amongst those who occupy themselves with the health of workmen. His Imperial Majesty's Government could not remain a stranger to this emotion, and the question of the absolute suppression of the manufacture and use of white lead has been seriously discussed. This question was submitted to a Committee of the Academy of Sciences, composed of the following gentlemen :—

Messrs. Chevreul, Majendie, Regnault, Séquier, Bussy, Legentil, Barbier, Davenne, and A. Tardieu, Secretary.

After giving the subject much deliberation, the Committee presented to the Minister a report, ending in the following recommendations :—

1st. There are not sufficient reasons for interdicting the manufacture of white lead, the improvements introduced into this fabrication having removed from it almost completely its insalubrity and its dangers; but it is of importance that the Administration should take measures that these improvements be adopted in all the factories, and that these themselves should be an object of special surveillance.

2d. There are no sufficient reasons for interdicting the use of white lead in works or painting, because certain precautions can

place the workmen out of all danger of lead powder and dust; and also because, to a certain point, for this particular use, the substitution of white zinc for white lead is gradually taking place of its own accord; and the support of the Government, and the difference of duty in favour of zinc over lead, encourage this substitution, without violent disturbance or interference with the freedom of commerce.

3d. The interdiction of the fabrication and the use of white lead in the arts and in commerce would have, moreover, the inconvenience of exciting grave difficulties as regards the state of the finances, &c.

The report, of which these are the conclusions, was read and discussed in the presence of the Minister and the Director General, and adopted unanimously. The Minister thought it necessary, while maintaining the manufacture of white lead, to ensure to all the workmen employed the benefit of the improvements already realised, as well as of such as might hereafter be brought about.

He, therefore, confided to the same Commission the task of preparing a general regulation applicable to all manufactories of white lead, and also of issuing a code of instructions on the use of this substance.

This required a profound study of all the processes made use of in the principal factories in France and in foreign countries. This study is not yet completed, and we cannot anticipate its results; we will, therefore, limit ourselves to saying, that making the manufacture of white lead perfectly healthy requires, besides the generalised employment of the machinery and apparatus above described, the greatest possible extension of working under water, and the preparation of the white lead in the form of ground paste.

We subjoin the conclusions of the Commission of the Academy of Sciences, composed of Messrs. Rayer, Pelouze, and Combes:—

"The maladies of white-lead workers may generally be prevented by the substitution of mechanical processes for manual work in those operations where the men are obliged to touch and handle the white lead.

"By the medium of water in the separation of the scales from the sheet lead, the powdering of these scales, and the sifting which follows.

"By substituting moulding in the form of prisms or bricks for the potting of the white lead made into paste with water.

"By making into a paste with oil, in the manufactory itself, by the aid of suitable apparatus, all the lead which has to be mixed with oil before being used.

"By enclosing in isolated chambers of the work-rooms all the machinery used for pulverizing, straining, or dry packing the white lead, when these operations are indispensable.

"Lastly. These measures will be rendered complete by a very active ventilation of the work-rooms, and by hygienic precautions of a nature easy for the workmen to observe."

On the manufactory of white lead in Paris, conducted by M. Besançon.

The large manufactory of white lead conducted by M. Besançon, in Paris, employs constantly twenty-five men, and produces annually one million kilograms of this substance.

The first process, that of melting the lead, for the purpose of running it into moulds of the form best adapted for its carbonatation, does not appear to have any injurious effect upon the health of the workmen, except their occasional liability to burns. The same man has been employed in that part of the work for upwards of seven years. No emanations take place during the melting. There is always a high temperature, but by means of an inverted funnel over the stove and melting place, great part of the caloric ascends the flue without escaping into the general atmosphere of the workshop.

The lead is then exposed to the action of fumes of vinegar permeating layers of tan, and when this process is completed the white lead is beaten off from the bars of metallic lead. This process is done by hand, and is the only part of the manipulation as conducted at these works that appears to present any real danger to the workmen.

Here they are exposed considerably both to the inhalation of the white lead in powder, as well as to the continual contact of it with their hands, and other parts of the body. Every precaution, however, is taken to diminish this danger as much as possible.

No man is allowed, under any circumstances, to continue at this work for more than seven days consecutively. On quitting their work the men are obliged to wash their hands and face in water containing a solution of sulphuret of potassium, secondly in water holding clay in suspension, and thirdly in pure water. They must use these ablutions whenever they cease work, before taking a meal, or retiring for the day. These are among the regulations of the police, and are made known to the workmen by placards printed and fixed up in various parts of the factory.

The white lead in small lumps beaten off from the cast lead is then ground to an impalpable powder, under water, between horizontal stones. Not the slightest powder, vapour, or smell escapes during this process. When the white lead has been thus finely ground, as much water as possible is pressed from the paste thus produced, which is then cut into masses, placed upon plaster of Paris or some absorbent material, and exposed to a current of warm dry air until it is perfectly anhydrous. These dry masses are then placed in large receiving boxes and reduced to small pieces by receiving a few gentle taps with a hammer.

No dust escapes in this manner, and this is an improvement in this part of the process well worthy of imitation in the English manufactures.

It is then placed in mills and mixed with a certain proportion of oil *immediately*, and the grinding is performed in contact with the oil, to prevent the escape of particles of the lead. No lead whatever is sold at this factory in the state of powder. It is all sent out previously mixed with the oil.

After the drying, as the lead before admixture with the oil must be in the form of an impalpable powder, it is passed through very fine sieves. This process, which in many manufactories is still done by the workmen themselves who shake the powder through the sieves, is performed here in hermetically sealed closets or small rooms, in sieves supplied with the lead and having their shaking motions communicated to them by the steam engine that works the grinding mills.

The whole manufactory is remarkably free from smell and dust. Every room and workshop is swept twice a day, while the men are absent from work. All the men appeared in perfect health, and quite free from all the symptoms of inhalation of lead. There was no blueness of the gums or any of the signs of lead poisoning to be seen. They assured me that none of them had suffered since they had worked in M. Besançon's factory, and M. Trebuchet, the Chef du Conseil de Salubrité, at the Prefecture of Police, who accompanied me in my inspection of this and the other établissemens industriels which I visited in Paris and its suburbs, stated that he had never received any complaints from the workmen of this factory since it had been carried on with its present improvements. Nevertheless, 5,000 kilograms of white lead are daily manufactured and ground therein.

The reason that painters and others who use white lead as paint, mixed with oil, suffer so severely from painters' colic, is, that they are not careful to remove from their hands and bodies the white paint which adheres to the skin, and which soon becomes absorbed.

Frequently they eat with their hands unwashed, and thus also convey directly to the stomach this mineral poison.

This manufactory is all that such an establishment can be, and is worthy of being made a model except in the following respect:—

The process of removing the carbonate of lead from the plates of metallic lead, now done by hand and sticks, could very easily be accomplished by some very simple machinery, out of contact with the atmosphere breathed by the workmen, or under water.

On the use of lead for water pipes, and for other purposes of domestic economy.

It has been said by a very celebrated physician—Rasori—"The most common and the most remarkable cases of accidents "caused by lead are generally due to the substances of which we "make the most frequent use, and which only contain very "minute quantities of this metal." He might have added, that these substances having no disagreeable taste, excite no suspicion; so that one may be attacked with lead disease, and attribute the illness to any but the real cause. Many instances could be brought forward which show that persons attacked in 1841, 1851, and 1852 with painters' colic, were treated for other complaints,

and that it was not till later that positive data were obtained of the causes which gave the disease. It is probable that a great number of such cases occur without their real nature ever being discovered.

On the action of water on lead.

Does water in contact with lead dissolve this metal, and can it become injurious to health?

Authors are not all agreed on the action of water on lead; indeed, there are authors who say that this liquid has no action on the metal; others have emitted an opposite opinion; others again assert that while certain waters have no action on lead, others have a marked effect on this metal. Louis, in a memoir that he has published on this subject, has made it known that water is capable of holding in solution lead in the state of acid carbonate, and that that which is not acidulated, and which is not in contact with the atmosphere, is in no manner altered in leaden vases. In support of this opinion, water which has passed through leaden pipes for a long series of years, without giving rise to any accident, has been instanced. M. Chevallier does not partake of this opinion, but believes that there are waters which, in traversing pipes, dissolve small quantities of lead, the dangers of which are not appreciated, because their evil effects have not been immediate.

Mérat and Barruel have proved that when water is kept in reservoirs of lead in contact with air, the carbonic acid combines with the carbonate of lead, forms an acid carbonate, which dissolves in the water. They made the following decisive experiment at the Faculty of Medicine in Paris:—Six double pailfuls of water were left for two months in a copper lined with lead; after the lapse of that time, analysis showed that the water contained 64 grammes (990 grains) of carbonate of lead.

Trouchin showed that painters' colic was very common at Amsterdam, and attributed the fact to the waters of that town being received on leaden platforms, and then running into cisterns, being used for drinking.

Wanstroostwyh remarked that at Haarlem the water caused the same accidents, due to the same causes.

M. Chevallier has examined water kept in leaden reservoirs, which at the floating line showed a greyish white discoloration, indicating the alteration of the metal; he showed that at the lower part of the cistern there was found a white precipitate of carbonate of lead; but, among the waters thus examined, there were some which showed, by tests, the presence of lead in solution, whilst others showed no indication of the presence of this metal.

In support of these experiments Dr. Christison, of Edinburgh, has established:—

1st. That there is danger in using leaden pipes for conducting water a considerable distance, without previously submitting the water to analysis.

2d. That the purest waters dissolve most lead.

3d. That the water which tarnishes shining lead after a contact of several hours, ought not to be conducted in pipes of this metal, until after certain precautions have been taken; that it is probable, *although this has not been proved*, that if the lead preserves its brilliancy after twenty-four hours of contact, leaden pipes may be used to conduct water which has had no reaction on the metal, and this without danger of accidents.

4th. That water which contains $\frac{1}{3000}$ of its weight of salts in solution cannot traverse pipes of lead without particular precautions.

5th. That this proportion of salts will be even insufficient to prevent alteration of the metal, unless carbonates and sulphates form the greater proportion of them.

6th. That the proportion of $\frac{1}{4000}$ and more even will be insufficient, if these salts are chlorides.

7th. That it is desirable, in all cases, the water offering even to appearance all the guarantees of purity, to make a chemical analysis thereof, after having left it some days in contact with the pipes.

8th. That when the water is of a nature to change the pipes and to attack this metal, it is proper to leave the pipes filled with water for a period of three or four months, mixing with this water a solution of phosphate of soda, containing $\frac{85}{1000}$ of this salt.

9th. That sulphate of lime in the proportion of $\frac{1}{3000}$ may be made use of in the same manner; in this case there takes place a precipitation on the pipes of a salt which protects them from further action.

The dangers which result from the use of water which has sojourned or run in leaden pipes, are clearly pointed out in the paper published by Dr. Guéneau de Mussy, called "*Historique de plusieurs cas d'empoisonnement qui ont eu lieu à Claremont par le plomb.*"

M. Guéneau de Mussy states, that being sent for to Claremont at the commencement of October 1848, he had to see several illustrious persons attacked with colic from an unknown cause; having studied the symptoms presented, he came to the conclusion that they were the result of poisoning by lead.

Examination of the gums confirmed this diagnosis; the analysis of the water commonly used by the patients, made by Professor Hoffman, showed that it contained a considerable amount of lead. The water from the leaden pipes was then discontinued, and various medicines ordered. Purgatives, with belladonna and opium, were prescribed, but unsuccessfully, in those cases where the poisoning had been of slow access, and the symptoms chronic. The results following the administration of resinous and saline purgatives, of castor oil, of calomel, of Croton oil, of sulphate of magnesia, were not more satisfactory. M. Guéneau then abandoned these medicines, to have recourse to sedatives, opium, belladonna, ice, weak infusion of rhubarb, which succeeded better in calming the nervous system and removing the constipation.

In the case of those patients who were experiencing the early symptoms of the disease, the disturbing action of energetic purgatives stopped the spasmodic accidents, which quickly disappeared.

The three patients who had more particularly attracted the attention of M. Guéneau by the severity of their symptoms, had been relieved by antispasmodics; but success was not complete, and these patients, whose system was still saturated with the poison, showed symptoms of cachexia. Dr. Guéneau then determined to make use of a chemical treatment; he prescribed a syrup of hydrated sulphuret of iron and sulphurous baths; the patients took a sulphurous bath every other day, and every alternate day a soap bath.

With two of the patients who were thus treated, chemical reaction showed itself in a most decided manner; in fact, the nails of the hands and feet contracted a black colour, and stains of the same colour showed themselves in different parts of the body. These last stains were removed by baths and friction with soap, but the discoloration of the nails did not take place by the same means.

Dr. Guéneau in this manner succeeded in curing his patients; and he says, that while some physicians and chemists have looked upon sulphur as the only remedy for poisoning by lead, others have considered it to be quite useless; that he is of the opinion of the former, since the success that he obtained by sulphur much surpassed his expectations.

Dr. Guéneau states that the lead did not act with the same intensity or the same rapidity on all the patients at Claremont. This fact explains itself, and one constantly sees in factories, patients who are not affected by the white lead, whilst others are attacked with frightful rapidity.

Dr. Guéneau then proceeds to give statistical details of much interest; out of 38 persons inhabiting Claremont, 13 were attacked with lead colic, 11 being men and 2 women.

The stream which supplies the palace at Claremont with water is derived from a spring which rises in a bed of sand about two miles from the palace; this stream had been selected from among several others on account of its great purity, and it had been brought, about five years before, to Claremont through leaden pipes. From what has been said above, it will be seen that the purity of the water had been the cause of the danger.

M. Guéneau shows also, that in various parts of England, accidents, due to the action of water on lead, had been previously observed, especially at Weybridge, in Surrey, at Windsor, &c.; and he asks, how is it that the water used at the Palace of Claremont had been used for so long a time without any accidents having been observed before? To this he replies:—The leaden pipes conducted the water into a large natural cistern, situated at a short distance from the spring; when the persons who have been the subjects of the numerous observations which precede, came to occupy the palace, they desired that the natural cistern

should be preserved from the animal and vegetable detritus which fell into it. For this purpose, a cylinder of iron, two yards in diameter, and six and a half in height, was constructed; it was sunk in the soil to a depth of five yards; the water ran into the cylinder, and a leaden pipe was fitted into it with a sort of mouth in the shape of a funnel, which jutted out some inches over the wall of the cylinder. This cylinder was closed at the top with an iron cover pierced with holes, which permitted the atmosphere to exert its pressure on the surface of water.

M. Guéneau is of opinion that all the mischief arose from thus altering the apparatus. According to him, the fact is certain; but, he says, at the same time, that he has only suspicions concerning the chemical reaction which caused the alteration of this water.

M. le Dr. Guérard, however, in a work full of interesting observations, has given an explanation of these facts, which deserve consideration. Nothing is easier, he says, than to explain what took place in this affair.

It is known, in accordance with the observations of M. Pouillet, that lead is positive with regard to iron, and especially cast iron. The substitution of the cylinder of iron for a leaden cistern, would have for result the effect of favouring the oxidation of the lead, which once transformed into the hydrated oxide, would be changed into carbonate, and dissolved in the excess of carbonic acid contained in the water. As the proportion of the poisonous agent was but small, the effects to which it gave rise only began to show themselves after a prolonged use of the poisoned water.

We deduce from this interesting fact a precept which we must not lose sight of; it is, that in reservoirs intended to contain water for household use, we must avoid establishing even an intermediate contact between lead and another metal, *and especially iron.*

We must not pass over in silence an observation which is interesting, in the highest degree, to the health of sailors, and to which recent facts have given great importance. Water distilled at sea by means of the "distilling kitchens," furnished with worms of lead, becomes charged with this metal, and it is to the employment of this water that have been attributed, in some cases, the attacks of colic experienced by a great number of the crews. Leaden worms should not be used in this apparatus, they should be iron.

We are perfectly convinced, says M. Chevallier, that the employment of lead to preserve or conduct water intended for alimentary purposes, may be followed by dangers more or less serious, and that it is indispensable to proscribe this metal for such purposes; by so doing, all danger will be avoided, and accidents prevented.

On the employment of the vases and utensils for the kitchen.

As to utensils and vases for kitchen use, for the table, or for the preservation of condiments, it is difficult to calculate what might be the effect of the lead entering into the composition of objects so universally employed. When it is considered that all the

common pottery is covered with a leaden glaze, capable of being acted on by the greater part of the condiments, greasy and acid materials, one is invincibly led to ask the question whether the incessant mixture of these small quantities of poisonous substances does not, in the long run, exercise an influence more or less deep on public health. This idea, that we should not, perhaps, have advanced without hesitation, we have frequently heard emitted and sustained by one of the most eminent members of the Council of Public Health; and we do not hesitate to say that it is worthy of the consideration and meditation of all hygienists. In some cases, direct observation shows how well this fear is founded. M. Chevallier reports the example of a farmer of the Gironde, who was attacked with painters' colic, brought on by gherkins which had been kept in a glazed earthern vase. The glaze was everywhere decomposed by the acetic acid; the vinegar in which the gherkins macerated was muddy, thick, and milky; it contained acetate, carbonate, sulphate, and chloride of lead.

Sometimes leaden salt cellars are employed. This is a dangerous custom.

The use of apparatus for making gaseous liquids, if containing leaden or pewter pipes that come into contact with the liquid, is to be avoided.

Sheet lead should not be employed for enveloping certain alimentary substances, especially preserves, or for tobacco.

Action of beer on leaden pipes.

Several cases of poisoning by lead having occurred in Lille and its vicinity, and these being traced to beershops, the subject was brought under the notice of the central Council of Salubrity of the Department du Nord, by M. le Dr. Gosselet; the following were the conclusions come to, which, with the report itself, received the sanction of the consulting committee, and subsequently of the superior authority.

1st. Beer, after remaining twelve hours in a leaden pipe, which has served to convey the liquid, carries with it lead both in a soluble and in an insoluble state.

2d. That this action takes place daily in the conducting pipes; that it is augmented by the acidity of the beer; that the longer the beer is kept in the tubes the greater is the action; that this action is exerted particularly during the night, so that then the beer may contain, on the average, half a millegramme of lead per quart.

However weak this amount may appear, it is very clear that it may prove noxious, as it is impossible to measure the toleration of each idiosyncracy, and it may happen, for instance, that this beer may be supplied every morning to one or two individuals who come to drink it before their breakfast.

It will, therefore, be prudent to prohibit absolutely the use of such pipes; and also to recommend practicable and inoffensive substitutes for them.

These substitutes must communicate neither odour nor taste to

the beer, and they must possess a certain flexibility to adapt themselves to the various positions of the barrels in the cellar.

M. Chevallier, who has consecrated great part of his life to the pursuit of this dangerous poison (lead), through so many of the common every-day substances, into whose composition it insinuates itself, guided by his great interest in the well-being of his fellow-creatures, has also experimented on the action of wine and cider on vessels of lead. He has proved that after forty minutes of contact, these liquids show the presence of lead, and that while cider attacks the metal with the greatest energy, all three, cider, beer, and wine, present, after a lapse of twenty-four hours, when treated with sulphuretted hydrogen, a considerable quantity of lead.

In many parts of France, wine and cider have been clarified with white lead and carbonate of potass, and a large number of attacks of painters' colic, and several deaths have resulted from this most reprehensible practice.

On the regulations in force in France regarding brickmaking.

Bricks, which are nothing but clayey earth baked, are made sometimes in ovens heated with wood, sometimes in the open air.

The first method causes abundant development of smoke at the commencement of the firing, and the establishments of this sort are, therefore, arranged in the second class of insalubrious establishments.

The second process is the most common in the north. The bricks are burnt in the open air, in heaps of several hundreds of thousands. Coals are there made use of, and, by preference, those which give the least smoke.

The greatest inconvenience of these heaps of bricks is, that they give off great heat by radiation, and that they throw in great abundance into the atmosphere air heated strongly and charged with the products of the combustion of coal. The crops and the leaves of the trees are sometimes scorched by it at a distance of 50 or 60 metres. These establishments, under the title of briqueteries, making up only one single furnace in the open air, are classed in the third category. No year passes that the Boards of Public Health and Salubrity of the Department du Nord are not consulted on 10, 15, or 20 demands for authority to establish works of this nature.

The constant jurisprudence of these Councils consists in imposing the following conditions:—

1st. Not to burn the bricks at a less distance than 50 metres from a public way, in conformity with a Police Law of the 22d June 1812.

2d. To surround the furnaces during the burning with canvas or mattresses stuffed with straw, intended to protect the neighbouring properties from the inconveniences of the smoke.

In certain cases permission to burn bricks in the open air has been refused, on account of the neighbourhood of a nursery-ground; and a close furnace has been exacted.

It is always arranged that in all cases of injury accruing from the smoke, the injured parties have a claim for redress. This is why many brickmakers subscribe to an engagement not to burn bricks until after harvest.

The Council of Salubrity of the Department of the Bouches du Rhone have always ordered that brick-burning furnaces shall only be lighted at the commencement of night. This plan greatly diminishes the inconveniences resulting from the smoke.

On the insalubrity caused by the process of gilding metals by means of mercury.

The art of the gilder by mercury has many kinds of inconveniences, which ensue from the operations necessitated.

These operations consist in the preparation of the gold amalgam, the "dérochage," the gilding, the volatilisation of the amalgam, the burnishing, the deadening, the treatment of the waste metal, and the cleaning of the flues.

These various operations are insalubrious from the following causes:—

1st. The volatilisation of the mercury.

2d. The disengagement of hyponitric acid.

3d. The contact of nitric, sulphuric, and hydrocyanic acids with the workmen's hands.

4th. The contact of the mercury and the acid nitrate of mercury under the same circumstances.

5th. The possible respiration of mercurial vapours, of acid fumes, and of soot or small particles of coal containing compounds of mercury.

6th. All these mercurial or acid fumes may spread into neighbouring habitations.

7th. The escape of the waters over the public ways may occasion the destruction of the paving or draining materials.

The following are the hygienic prescriptions of the Council of Salubrity of Paris, which indeed are due for the most part to the inexhaustible genius of D'Arcet.

A furnace constructed on the system of this chemist, that is to say, provided with particular melting places for each of the operations where vapours are disengaged, prevents all the dangers arising from the volatilisation; great care must also be taken in making openings as small as the execution of the operations of the workman will permit, and to supply the furnace room with the largest possible amount of air that the furnace requires.

D'Arcet has directed attention to the *descending* currents that may take place in a chimney, and to the causes that may give rise to these. One can easily conceive the dangers which may result from such currents, established in the chimnies of gilders, when

these are lined with a mercurial soot, or still filled with acid or mercurial fumes, after operations but recently terminated.

The workmen are recommended, with the view of preventing the contact of the mercury and the amalgam of gold and of the acids with their hands, to wear while at work gloves of bladder, of varnished silk or leather.

Colonel Paulin has proposed the use of particular gloves for the workmen who use the scratch-brush. The workmen are also strongly advised, with the same view, to wash their hands frequently in soap and water, in order to saturate the acids with which the hands are frequently impregnated.

There are other precautions to prescribe in respect to sweeping the chimnies. The sweeper should be clothed in such a manner that every part of his body, the face excepted, should be out of contact with the dust, and a moist sponge should be placed before the nose and mouth, so that during the act of respiration no particles of soot be introduced into the mouth or lungs. Before ascending the chimney, also, a considerable quantity of steam should be sent up the chimney, the object of this precaution being to prevent the formation of dust, and to condense the existing vapours.

The following are the precautions recommended by the Council of Salubrity to preserve the neighbours from the injurious conditions in which they might otherwise be placed.

The chimney of the gilder is, in fact, the channel of escape for all the insalubrious emanations.

These emanations are carried to a distance, so much the greater as there exists a stronger draft and more fire in the furnace; their quantity is in proportion to the importance of the establishment. It follows, therefore, as a general rule, that a gilder by mercury is an unwholesome and sometimes even a dangerous neighbour. From thence results the necessity of an extreme elevation of his chimnies, whatever may be the combustible employed, and this elevation should be larger as the quarter is more populous. Ordinarily the Council of Health demands two or three metres above the roofs of any of the neighbouring habitations within a radius of 25 metres.

The escape of the washing waters through the public ways is a source of mischief to the soil by the quantity of acids they contain. The Council of Health prescribes the saturation of these acid waters with chalk before they leave the establishment.

The establishments of metal gilders are placed in the third class of insalubrious establishments.

On the Regulations contained in the Royal Ordonnance of 27th January 1846, *regulating the manufacture of gas.*

The manufacture of gas, which has now assumed not only in large towns but even in small cities, an extraordinary develop-

ment, demands on the part of the administration strict surveillance and minute regulations.

The immense furnaces indispensable for the manufacture of a product essentially inflammable itself, necessarily incur danger of fire, at the same time that they produce considerable smoke and odorous gas, very noxious to the neighbours.

Therefore the administration has imposed special conditions on the factories where gas is made, on the works for condensing and purifying, and on the gasometers and portable vessels into which the gas is compressed.

The danger of the gasometer bursting has been much exaggerated. In order that the gas of a gasometer should explode, it must contain at least seven times its volume of atmospheric air, which, according to Messrs. Monfalcon and de Polinière, is impossible under any circumstances. It is known that the quantity of oxygen necessary to make carburetted hydrogen explode, depends upon the proportion of the elements of this gas. To be completely burnt, the bicarburet of hydrogen requires three times its volume of oxygen; but oxygen only enters for one-fifth into the composition of atmospheric air.

The circumstances are changed when the gas, escaping by some fissure or through some badly closed cock, accumulates in a well closed apartment; the mixture which results from its union with the atmospheric air may cause an explosion on contact with a light, and this it is which so often takes place.

The necessity results from such accidents to find a speedy remedy for escapes of gas, and to close the cocks perfectly.

When gas escaped from a fissure or an open tap accumulates in a closed room, much more severe accidents may result. Persons asleep have been asphyxiated and have perished.

The more sulphuretted hydrogen the gas contains, the more deleterious is its action on the respiratory organs.

One of the greatest embarrassments which have weighed upon this industry (gas making,) is the residues furnished by the products of condensation and purifying, of which it has been for a long time very difficult to find the means of riddance, or for employing usefully.

The tar, a very considerable product of the distillation of coal, has a very disagreeable odour, which communicates itself to the washing waters and to the water of the gasometer, where it unites with another product of the distillation, the sulphuretted hydrogen. These waters, which they did not know what to do with in London, were formerly conducted to the Thames, where during several years they infected the river for a considerable distance and destroyed the fish.

This took place in Paris, thirty years ago; an enormous basin of the gas factory of the Luxembourg having burst, all the materials contained in this basin found their way into the river, not without having infected several quarters of the town, and caused a vast number of fish to perish.

These products are now utilised.

Royal Ordonnance concerning Gas Work 27th January, 1846.

1st. The works where hydrogen gas is produced, and the gasometers belonging to them, remain arranged in the second class of establishments dangerous, unwholesome or inconvenient, except in two following cases.

2d. Are ranged in the third class those small apparatuses for making gas, that are only able to produce, at most, 10 cubic metres in 12 hours.

3d. Are equally ranged in the third class, the gasometers not belonging to apparatus whose capacity exceeds 10 cubic metres. Those of a less capacity may be established after declaration to the municipal authority.

4th. The workshops for the distillation, all the buildings belonging thereto, and the magazines for coals belonging to still-rooms, even when they are not attached to these rooms, shall be built and covered with incombustible materials.

5th. There shall be established on the highest part of the roof of the workshops, for the exit of the vapours, one or several openings surmounted with pipes or chimneys, the height and diameter of which shall be fixed by the act of authorization.

6th. No animal matter shall be employed for the manufacture of gas.

7th. The coke shall be extinguished on its being withdrawn from the retorts.

8th. The condensing apparatus shall be constructed in the open air, or in buildings ventilated at the upper part, unless the condensation be carried on in pipes sunk in the soil.

9th. The apparatus for purifying must be erected in buildings ventilated by a special chimney, established at the upper part of the roof, the height and diameter of which are to be determined by the act of authorization.

The gas shall never pass from the retorts into the gasometer without previous purification.

10th. All other mode of lighting other than that of safety lamps is formally interdicted in the condensing and purifying places, as well as in the interior and environs of the buildings enclosing gasometers.

11th. The ammoniacal waters and the tar produced by the distillation that are not immediately removed, shall be deposited in pits hermetically closed and water-tight, the capacity of which which must not exceed 4 metres cube.

These receptacles must be constructed of stone or bricks and hydraulic mortar, and covered with cement equally hydraulic; they must be placed under covered buildings.

12th. The tar, the ammoniacal waters, and the milk of lime, as well as the solid lime from the purifying apparatus, shall be immediately removed in vases or barrels hermetically closed.

13th. The aqueous residue must not be evaporated, nor the tar burnt in the cinders or in the furnaces, if any smoke or odour shall result from so doing.

14th. The number and size of the gasometer of each manufactory shall be such as, in case of accident happening to one of them, the others may suffice for the requirements of the supply.

Each factory shall have at least two gasometers.

15th. The basins into which the gasometers plunge shall be completely air-tight; they shall be constructed of stone or bricks and hydraulic mortar, or of wood; if the basins are of wood, they shall be placed in a receptacle of masonry.

If the walls rise above the surface of the ground, they must have a thickness equal to half their height.

The basins at the level of the ground shall be surrounded by a balustrade.

16th. The bell of each gasometer shall be supported by fixed chains, so as never to swerve from its vertical position.

It shall, moreover, be so placed that the elastic force of the gas in the interior of the gasometer shall be greater than the pressure of the atmosphere. The internal pressure of the gas shall be indicated by a pressure gauge.

17th. The gasometers of a capacity greater than 10 metres cube shall be entirely isolated, not only from the buildings of the works, but also from the neighbouring habitations, and shall be protected by lightning conductors, the stems of which shall have an elevation equal to not less than half the diameter of the gasometer.

18th. Every building containing a gasometer, of whatever size, shall be ventilated by means of openings made in its upper part, so as to avoid an accumulation of gas in case of escape.

There shall be made, moreover, in its sides several openings, which should be protected by open blinds.

19th. A safety tube, intended for conveying the gas above the roof, shall be adapted to every gasometer established in a building.

If the gasometer is in the open air, the tube may be replaced by four openings of 1 or 2 centimetres in diameter, placed at 8 or 10 centimetres from its lower border, and at equal distances from each other.

20th. Only gasometers not exceeding in size 10 metres cube at most, may be placed in cellars, such cellars to be only used for the gasometers. They shall be properly ventilated by means of two openings, placed one near the floor of the cellar, the other in the highest part of the arch. This latter opening shall be surmounted by a tube for escape, more elevated than the roof of the house.

21st. The first filling of a gasometer can only take place after a verification of its construction, and in presence of an agent delegated by the municipal authority.

22d. The portable recipients of condensed gas shall be made of copper or sheet iron; they shall be proved by a pressure double that which they will be subjected to in daily use, and which shall be determined by the act of authorization.

23d. The gas furnished to consumers shall be completely purified. The purity shall be certified by means prescribed by the administration.

24th. The works and apparatus above-mentioned may, besides,

be subjected to measures of precaution which may be recognized as useful in the interest of safety or of public health.

25th. The Royal Ordonnances of 1824 and 1838 concerning gas establishments are repealed.

On a new method of purifying gas, to which was awarded the Montyon Prize by the Academy of Sciences of Paris in 1850.

(Extracted from the "Comptes Rendus" of the Imperial Academy of Sciences of France.)

Since the year 1841 M. Dumas has given to the Academy of Sciences a favourable account of the process invented by M. Mallet; since that period the committees for adjudging the Montyon prizes have frequently been occupied with examining this process.

The different reports all gave similar testimony; but it was judged expedient to wait until the realization of the principal advantages of this new application had acquired, by being tried in several gas manufactories, such a degree of certitude as rendered sure the service performed.

The Commission thinks that this time is now arrived; for a great number of manufactories have now adopted this method of purification. It is now established in the manufactories of gas at Roubaix, Turcoing, St. Quentin, St. Denis, and Douai.

In Belgium the same apparatus acts with success in three factories—Brussels, Bruges, and Courtrai.

The process of M. Mallet consists in the employment of metallic solutions, particularly of chloride of manganese—the residue of the preparation of chlorine. This solution, saturated with some of the ammoniacal liquid from the gas works, is placed in the apparatus or purifiers disposed in three stages in such a manner that the solution passes from one into the other, whilst the gas passes through the liquid in the opposite direction.

This sort of methodical washing arrests in its passage the carbonic acid, the sulphuretted hydrogen, and the ammonia; also, the hydrochlorate of ammonia in solution. Mechanical agitators keep the precipitate in suspension in the three vases; it is from the last of these vases that the thick solution charged with the products of the purification is withdrawn. This liquid is allowed to deposit in proper recipients, the clear liquid which contains the hydrochlorate is decanted off, and the sal ammoniac obtained in the solid state by evaporation and crystallisation.

As to the gas which has undergone this first purification, it still contains a little sulphuretted hydrogen; this is very easily got rid of by passing it through pulverulent hydrate of lime, in the usual purifiers.

The process of M. Mallet, in eliminating the sulphuretted hydrogen, disposes of one of the principal causes of the infectious odour of gas, and prevents the formation of the sulphurous acid gas;

it therefore renders the air breathed more salubrious, and diminishes or destroys the inconveniences of the mixtures of sulphuretted hydrogen or sulphurous acid gas which darkened silver plate and paintings with white lead, or oxydised objects made of iron, steel, and copper.

The purification of gas by this process allows the collection of the salts of ammonia which were lost formerly. Every ton (1000 kilogrammes) of coals distilled furnishes at least 6 kilogrammes of hydrochlorate of ammonia; the gas works of Roubaix and Turcoing, St. Quentin, St. Denis, and Douai collect annually 66,000 kilogrammes of this substance; and proportional quantities are collected in Belgium.

The Commission, considering that M. Mallet has actually realized an application useful for salubrity and industry, has judged him worthy of receiving a reward of 500 francs on the Montyon foundation.

On a new method of purifying gas, to which was awarded the Montyon Prize by the Academy of Sciences of Paris, in the Year 1850.

(Extracted from the "Comptes Rendus" of the Imperial Academy of Sciences of France.)

After numerous trials, M. de Cavaillon has determined the conditions favourable to the *economical action* of sulphate of lime on the carbonate of ammonia contained in coal gas. He has even contrived to unite those conditions by means so simple and, nevertheless, so efficient, that from that time he has been able to carry out the purifying process without requiring any change in the apparatus used in the manufactories of lighting gas, without even increasing sensibly the pressure on the tubes, joints, and distilling vases.

These remarkable dispositions have permitted him to introduce without difficulty his means of purification in the large gas works of Paris and the suburbs. He procures the chemical agent that he employs at but slight cost, by collecting in towns the old plaster work of pulled down walls and houses that is thrown away as useless; then with the help of a grooved mill he reduces it to powder, which, after being properly moistened, he transforms into sulphate of lime by treating it with dilute sulphuric acid. This material is rendered more permeable to the gas by adding to it broken débris of coke.

The sulphate of lime, thus prepared, is placed on the screens or strainers of wood or metal of the ordinary purifiers. The gas, in passing over this matter, abandons the carbonate of ammonia, which, in decomposing the sulphate of lime, causes a double transformation, producing carbonate of lime and sulphate of ammonia.

On leaving this apparatus, the gas passes into the usual purifiers of hydrate of lime, when the hydrosulphuric acid (sulphu-

retted hydrogen) is much more easily fixed than it could be when the carbonate of ammonia accompanied the gases.

The gas works of the Faubourg Poissonière and of Vaugirard have adopted the process of M. de Cavaillon. The skilful engineer of the Compagnie Française, M. Meymel, declares that the purification, almost perfect by this process, leaves nothing to desire; that the pressure on the retorts is not augmented; in a word, that no inconvenience whatever results from the process of M. de Cavaillon.

We have ourselves proved the exactness of these assertions in examining the system of purification at the gas works. It has been easy to make sure, also, that M. de Cavaillon extracts by means of simple cold lixiviation the sulphate of ammonia dissolved, and that evaporation permits this salt to crystallise. This process is also employed for purification in the great works of Messrs. Dubochet, Pawels, and Co., Barrière of Fontainebleau.

The quantity of sulphate of ammonia that M. de Cavaillon obtains from the three establishments exceeds 200,000 kilograms.

The ingenious processes, simple and efficacious, by the aid of which the author has realised the *economical application* of sulphate of lime to the purification of gas for lighting, are worthy of the attention of the Academy; and the Commission is of opinion that M. de Cavaillon well deserves to receive a recompense of five hundred francs on the Montyon foundation for making more healthy insalubrious arts.

On the measures ordered by the Council of Salubrity of Paris, to be taken by metal gilders by the moist process, to preserve the public health.

The following are the measures of security ordered by the Council of Salubrity to be taken by metal gilders by the steeping method:—

1st. To restrict as much as possible the opening of every furnace, without impeding the work.

2d. To raise the chimney at least two metres above the roofs of any of the neighbouring houses.

3d. To establish a good draft furnace in each forge.

4th. Not to carry on the operations without there being a strong draft to the furnace.

5th. To keep constantly at the disposal of the workmen a bottle of ammonia, so that they can inhale the gas in case of any accidents caused by the nitrous vapours.

6th. To keep in the workrooms a certain amount of chalk, so as to saturate immediately the acid waters which might escape over the soil, &c.

On the alterations produced on the hands of burnishers of brass.

The burnisher holds himself by the right hand which is open. The left hand serves to fix the work, which, placed between the thumb and index finger, is strongly bent against the table.

The palmar surface of the right hand becomes callous, horny, and darkened, except at the bendings of the joints. The smallest phalanx of the little finger constantly remains in a state of flexion.

On the left hand, the skin covering the dorsal surface and the radial border of the index finger, and especially the head of the second metacarpal bone, is very hard and callous. The extremity of the palmar surface of the thumb is in the same state.

On the precautions and police regulations to be observed by percussion cap and firework makers.

Fulminating powder is composed of fulminate of mercury and nitre, mixed together by rubbing. It is indispensable for this operation to take precautions not less minute than those for making chemical matches. The moist paste resulting from the rubbing must be carried without delay to the drying house, where it is divided, and placed upon stages.

When the fulminating powder has been sufficiently re-dried, it is granulated upon a hair sieve placed on a wooden table, pressing it lightly with the hand. This operation is not less perilous than the drying, and demands as many precautions. Rubbing it too hard, more especially if there happen to be in the mass parts too dried, would cause an explosion, and M. Gaultier de Claubry states that an accident, which caused the destruction of a factory and the deaths of two operatives, was produced by that cause.

In spite of every care, as the mass to be granulated easily arrives at a state of desiccation that renders it dangerous, it is highly important only to place on the sieve a very inconsiderable quantity of powder, and to pass the sieve itself through water after each operation, and also *before* the granulation, when a certain time has elapsed between the two operations. M. Gaultier de Claubry advises that the lower border of the sieve should be covered with a plate of lead, in order to avoid detonations that would be liable to be produced if the strainer happened to fall out of the hands of the operator, and fell on the granulated material.

The granulation takes place on a wooden table; however, M. Gaultier de Claubry is of opinion that it is better to cover this table with black varnished leather or linen, well stretched, which allows the smallest particles of powder to be more easily seen, and to be removed with a damp sponge. The operation will be rendered still less dangerous by underlaying the black cloth cover with two or three layers of thick flannel or green baize. The granulated powder, mixed with priming powder, is poured into a

box of tin plate lined with tin foil. To dry the granulated powder, it is placed on sheets of grey paper in deal boxes, and these are carried to the drying-room.

When the powder is sufficiently dry, it is brought back to the granulating room, where it is poured upon a hair sieve, so as to separate the priming powder from it.

When this separation is completed, the powder is introduced by means of a pasteboard funnel into bottles, which ought not to contain more than 5 kilograms (11 lbs.)

These bottles should be surrounded with reed and covered with a skin.

When it is desired to use the powder to charge the percussion caps, it must first be placed in smaller bottles. It is poured, by means of a pasteboard funnel, into small bottles, made of varnished leather. These are then carried into the charging-room in a box lined with leather, and placed beside each woman, who uses them as her work demands.

The powder, perfectly dry, is brought from the powder-room into the charging-room, where the priming caps are made.

They begin by transferring the powder from the large to the small leathern bottles, and it is of the highest importance never to do this in the powder-room, but only in the open air, the door of the powder-room being shut. The powder is poured into the leathern bottles, which should never contain more than the quantity of powder necessary for a portion of a day's work. This transference ought to be performed on a wooden table, covered with a black glazed cloth well stretched, itself placed on two or three thicknesses of woollen material.

The *caps* are of thin copper, made hollow by machinery. They are delivered to the workwomen, who arrange and dispose them in an instrument called a *hand*, which serves to charge them with fulminating powder.

When the *hand*, which contains 100 caps, has been properly charged, it is passed to a workman, who places it under a press.

It is easy to understand that this latter operation is one of those which gives rise to the greater number of the accidents, or, at any rate, to the most frequent detonations, at the moment when the press is at work.

Numerous accidents have taught us how important it is that the press under which the *hands* charged are passed, should be disposed in such a manner that the workman should not be in front of it when he makes the lever act, in order that if an explosion does take place, he may, at any rate, avoid the shock of the projected hand.

The charging terminated, the caps are placed in boxes of pasteboard, of 250 and 500, and these boxes are packed 20 or 40 together. These packets should then be arranged with care in solid cases containing 100 or 200 packets, the interior of the case being lined with a square skin of larger dimensions than the case itself, so that it may envelop the entire contents.

This precaution is to diminish, as much as possible, all chances

of accidents which might take place during the transport of the caps from the manufactory to the magazine.

Such are the dangers that the fabrication of fulminating powder and percussion caps gives rise to, and such are the best means for preventing them. They consist, in the first place, in a good arrangement of the workrooms, which should be completely isolated, constructed of very slight materials, such as boards and canvas, so as to avoid, in case of explosion, the projection of heavy masses; and, lastly, that the rooms should be heated by the circulation of hot-water instead of by stoves.

It is right that the room where the fulminate of mercury is made, should be separated from all the other workshops; but the powder should not be carried after its desiccation any great distance, at any rate, without taking very great precautions.

In the last operation, namely, that of charging the caps, it is very important that the women who fill the *hands* should be protected by a buckler of sheet iron against the explosions. It is by such precautions as are above described, and by ingenious modifications introduced into the mechanical part of the different operations, that the inconveniences of one of the most dangerous employments which exist can be diminished.

The following are the measures of salubrity prescribed by the Council of the Seine.

Ordonnance for the Manufacture of Fulminating Powder and the Charging of Percussion Caps.

1st. Every factory for the fabrication of fulminating powders and percussion caps shall be completely isolated from every dwelling-house, and be distant from roads and public paths; it shall be surrounded on all sides by walls.

2d. The room where the fulminate of mercury is made, shall be distant from all the other workrooms, and particularly from the powder depôt and the stores of alcohol necessary for the works.

3d. The other workrooms shall be isolated from each other, and constructed in lath and plaster without rubble; the ground shall be covered with sheet-lead.

4th. No fire shall be made in the workrooms, and no work shall be carried on by artificial light.

5th. The walls of the drying-house shall be furnished with shelves of deal, the highest of which shall receive nothing; these shelves shall be fastened at such a height that the objects placed on them can be reached without being obliged to mount either on a chair or bench.

6th. No sieve, the strainer of which is made with metallic wires, can be employed, and the sieves must be furnished with lead round their lower borders.

7th. The granulated and dried powder shall be enclosed in bottles covered with reeds; and these bottles kept in the powder store.

8th. The powder store shall be absolutely isolated; it shall be

provided with a lightning conductor. The only row of shelves which shall be placed there shall be placed at such a height that, in order to reach the bottles placed on the shelves, no mounting is necessary; the floor of this powder-room shall be covered with a sheet of lead.*

9th. No transference of powder must be made in the powder depôt, under any pretext whatever.

10th. The boxes in which the workmen enclose the bottles of powder shall be lined with leather, stuffed with wool or hair.

11th. Not more than a tenth, at the most, of the powder to be used in one day, shall be transported at a time into the charging room.

12th. The director of the establishment, and the superintendent of the workshops, shall alone have the key of the powder-room.

13th. The foreman should possess chemical knowledge, and present some moral responsibility.

14th. No workman younger than 18 years of age shall be employed; no workman shall be allowed to smoke in the manufactory or workrooms.

15th. No manufactory of detonating powder or caps shall have permission to be established without sending in before-hand an exact plan of all the internal arrangements, which, after their approval, shall not be changed, under any pretext, without a new authority.

On the substitution of a new material for the charcoal powder now in use in casting bronze and other figures, &c.

In manufactories of bronze and other ornaments, of which there are many in Paris, and which cause the employment of a very considerable number of artisans of a high class, and who earn very considerable wages, there have been constant complaints made to the Conseil de Salubrité of Paris, of the serious attacks on the constitution, and the frequent diseases caused by the inspiration, in large quantities, of powdered charcoal.

This substance is employed, in very considerable quantities, for dusting over the inside of the moulds used in casting the bronze or brass objects, and to prevent the adhesion of the sand or clay to the fluid metal. When dusted out of a coarse canvas bag upon the mould, the atmosphere surrounding the workmen becomes perfectly black with charcoal, and as this substance is always used in the finest possible powder, it is taken into the nose, mouth, throat, and lungs with every inspiration. The complaints of the workmen of the ill effects of this on their health are loud and universal.

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* The Council has proved that it is very difficult to cause fulminate of mercury to detonate when placed on sheet-lead.

I questioned several of the artists employed in this work, as well as some of the foremen, and from their evidence it appears that the following are among the principal effects.

The first symptom is a constant cough, evidently an effort of nature to rid herself of a foreign and irritating substance. This is followed by spitting blood, and being awoke during the night with cough, accompanied with considerable pain in the chest. After a night attack of this sort the patient has no appetite, and resumes his work the next day without having been able to eat his breakfast.

They soon begin to find that the excretions from the nose and lungs become perfectly black, being evidently coloured by the carbon.

The men whom I saw employed in this work, especially those at Messieurs Eck and Durand's factory, in the Rue des Trois Borgnes, in Paris, looked ill and consumptive. They were wan, sallow, and very thin.

A very efficient substitute for the powdered charcoal has lately been discovered, which has been tried and found to answer the purpose as well, in every respect, as the charcoal, while it is free from the evil consequences of the latter. This is the finely powdered fecula or starch of potatoes. The workmen, as well as the foremen who had employed it, all assured me that it prevented the adhesion of the substance of which the mould was formed to the hot metal; that it made the surface of the casting equally as fine and smooth, and that it did not cause the great irritation of the lungs and mucous membranes induced by the present process. The Academy of Sciences has judged this to be so great an improvement as to be worthy of reward from the Montyon fund for rendering more healthy noxious trades and occupations.

I am of opinion that this knowledge should be disseminated among persons engaged in similar employments in this country.

On the hygienic conditions of nail makers and iron founders.

Doctor F. X. Masson has made a most valuable series of observations, confined, however, to French Ardenne, which bear particularly on a population employed in working iron, and especially nailery and iron foundry, the two great industrial employments of the Canton of Charleville.

These observations I now proceed to condense in this paper.

Although the workmen of these two industries have many points in common with each other, they nevertheless present in the conditions of their existence some curious peculiarities.

Nailers.

The nailers of Ardenne, united generally in groups of six or seven, associate together to work in the same workshop, at the

fire of the same forge, the bellows of which is set in movement by a dog. In these shops the nails are made with a hammer by hand, and the head of the nail by means of moulds or matrices in steel, called *clouières.* The iron made use of has been previously drawn out in long stems, the thickness of which is proportioned to the species of nail required to be made. A block of hard wood is fixed in the earth, close to the forge and in front of the workman; on this block are placed, in a fixed and invariable manner, 1st. What is called the place—a small anvil for drawing out the nails; 2d. Another little anvil to dress the nails; 3d. Scissors for cutting them; 4th. the clouière for forming the head, and for finishing it. The other instruments of the nailer consist of two pinchers and the hammer already spoken of.

Children are placed at the forge a long time before their physical development is fully operated, sometimes as early as seven or eight years of age; and, in certain communes, young girls themselves make nails long before the age of puberty; and one sees men, women, and children, all mingled together, working from morning to night. Placed in half circles round these forges, the fire of which warms them in the winter, lights them in the long evenings, and which often cooks their food, the nailers strike uninterruptedly and with repeated blows on the iron from which they manufacture millions of nails of a hundred different kinds. In a state of complete immovability of the legs, in a continual movement of the arms, with a perpetual balancing of the body, they thus pass their lives in the midst of the sulphurous vapour of coke, and of an atmosphere heated by the forge, and vitiated by the emanations of human beings and the dejections of dogs. Under such influences, the physical constitution of the nailers deteriorates, and there results from these circumstances certain special deformities that it is of great importance to point out, with a view to their correction and prevention.

The nailer has raised shoulders, and the left is higher than the right. The trunk is inclined to the same side, and the weight of the body, inclining in this sense, bows the corresponding leg, which causes the nailer to be uncertain in his walk, and to limp often in a marked manner.

The hands are deformed, especially the right; it has this constant character, that the fingers are curved inwards, so as to form an angle with the metacarpus, and so as not to permit the index finger to oppose itself to the thumb; thence the impossibility of raising a piece of money from a table in the ordinary manner, and the necessity of bringing it by the edge of one hand into the other, as is usually done for small seeds or pulverulent substances. This peculiarity will make a nailer be recognised anywhere, as also will the odour of dogs impregnating his clothing. A very common infirmity with those who make nails, is a contraction of the fingers, and even of the hand, which does not permit of their extension or opening; this obliges them in certain cases to take the hammer in

the left hand to insert it in their right hand when about to use it. If, besides, it is considered that the manufacture of nails is injurious to the growth of the individual who gives himself up to this industry too young, it will be easily understood why there are in the Canton of Charleville so great a number of nailers, mean in appearance, undersized, slender, and out of condition by their size, their infirmities, the feebleness of their constitution, to furnish soldiers for their country.

The vices of construction and the bad arrangement of the workshops exercise likewise an unfavourable influence on the constitution and the health of the workmen. They are almost always too small, and not sufficiently lighted or ventilated, and the extreme carelessness of the nailer augments still more the inconveniences which result from their faults of construction. They are but rarely cleansed, and the excrements of the dogs are allowed to remain there much too long. Hence arise disagreeable emanations, that peculiar odour which impregnates the very garments of the workman, and cause him to be easily recognised as a nailer by those who are accustomed to them.

Potatoes form the basis of the ordinary food of the inhabitants of the Ardenne; they constitute, together with coffee, bread, a few vegetables, a little butter or grease, all the nourishment of the nailer during the entire year. Coffee is in general use, it is the breakfast of every one, of the poor as well as of the well-to-do workman, and of the rich man, and in certain families it forms, so to speak, the whole day's nourishment. There are even women who have so strong a passion for this liquid that they drink it from morning to night. However, the coffee of the Ardenne is a liquid scarcely coloured with chicory, or but slightly flavoured with true coffee, without sugar, or scarcely sweetened with treacle or brown sugar. The nailers say that their coffee appeases their thirst well, that it prevents their being dry, and that without it they would be unable to support the heat of the forge during the heats of summer.

To terminate what is to be remarked about the hygienic habits of the nailers, I will add that the working garments of the men and women are not sufficient to protect them from the sudden changes of temperature to which they are exposed.

Iron Founders.

These artizans are employed in making objects of iron, as shovels and pinchers, window fasteners, screw-bolts, screws, screw-nuts, bolts, and spring-plate bolts.

The iron-workers are distinguished from the nailers by their physical powers being less changed, less vitiated, and by possessing more force and vigour of constitution. They owe this happy distinction to the very nature of their work, which is less painful and more varied. The workman in iron is not constrained, like the nailer, to preserve constantly and necessarily the same

position. Whether he forges, or files, or worms, or turns, or polishes the thousand and one objects that he manufactures, he has moments of inaction, instants of repose, which allow his limbs the momentary liberty they require, and the changes of posture so necessary to them. The workshop that he occupies is also always much larger and better aerated than that of the nailer, and consequently much healthier.

If we add, lastly, that the blacksmith earns higher wages, that he enjoys more comfort, and is better fed, it will be easy to understand the differences remarked in the constitution and the health of the two classes of workmen.

The maladies to which these two classes of whom we have spoken are subject, present some interesting peculiarities, which it is desirable to indicate.

Ophthalmia is very common among iron founders, and especially among nailers, whose sight is fatigued by the vacillating fire of the forge, by the brightness and heat of the fire, by the fineness of the objects they manufacture, and by the fixity of their looks on these objects. It is in a great measure to repeated inflammation of the eyes that many of these workmen owe, towards the end of their days, this feebleness of vision that puts them out of condition to work.

Coryza, which is usually so simple a complaint, assumes sometimes with iron founders an extraordinary intensity, and produces most distressing symptoms. The inflammation prolonged into the frontal sinuses, and continually exasperated by the concussions of the hammer, gives rise to intolerable pains in the head, to fever, even to delirium, and sometimes endangers the life of the patient.

The continual acts of imprudence that the workman commits in leaving his workshop in a state of great perspiration, and in exposing himself, in an inconsiderate manner, with his arms naked, and in his shirt, to the cold and humidity of the atmosphere, frequently bring on catarrhs, pleurisy, and rheumatic affections.

M. le Docteur Masson describes also chronic inflammations of the liver, which he attributes "to the repeated concussions which the liver receives from the action of the hammer on the anvil, to the different compressions that this organ undergoes during the work, and still more to the excessive quantity of beer consumed, which disturbs the functions of the stomach, and influence, in a special manner, the biliary organ."

Lastly, two surgical affections are constantly met with in the iron founder, namely, inflammation of the axilla, and whitlow, caused by a blow, a spark of iron introduced in the flesh, a burn, or fatigue caused by using the hammer.

Certain other infirmities attack nailers and blacksmiths, especially the former; we will mention amaurosis, arising from the fact that the evening's work only takes place by the vacillating light of the forge, and by the lively and fugacious brilliancy of the red-hot iron withdrawn every minute from the furnace. Also difficulty of hearing and deafness itself, which are explained by the fatigue

undergone by the organ of hearing; the result of the continuous and monotonous noise of the hammer; dyspnœa and asthma, depending on the maladies already described, and varices produced by the continual vertical position.

But Dr. Masson does not confine himself to this sad enumeration of inconveniences, of dangers, of diseases and infirmities to which the Ardenne nailers and forgers are exposed; he endeavours to make known remedies for them. A first observation, full of interest, and which deserves particular attention, is that the bad manufacture of the tools and the very faulty manner of using them have a direct and very active influence on the alterations and deformities with which the nailers are afflicted. On this subject it is extremely interesting to attend to the useful reforms proposed by M. Vitasse, a former journeyman nailer, whose intelligence and energy has raised him among the ranks of the most distinguished masters.

According to M. Vitasse, "the apprentice becomes deformed, bent forward or to one side, because the working instruments which he uses are out of proportion to his strength and his size, and that for the most part they differ in no manner from what an adult would employ. The block of wood on which are fixed the anvils &c., should be neither too high nor too low; the "place" and the "pied d'étape" inserted in the block should be on a level with the hip of the workman, and these two tools should only be separated from each other by a distance of eight hundreds of a metre.

"The hammers which the nailers use are generally too large and too heavy, and they are badly made. For a child ten years old, the hammer ought not to be more than 625 grammes = 1 lb. 6 oz.; for a child twelve years of age, 700 grammes = 1½ lbs.; of eighteen years, 1 lb. 9½ ounces, or 750 grammes. It is necessary that the hammer should be curved on itself towards the handle, and that it should end in a head broader than the body of the instrument. The actual form of the hammers is such, that the spangles of red-hot iron in a state of incandescence are thrown on to the hand of the workman, who, fearing lest he should be burnt, especially on commencing the business, works with less assurance and more hesitation; and when he feels the pain of the spark, he stops, disturbs his work, and does it with less celerity and precision.

"The handles of these hammers are too short and too thick; which, joined to their weight, requires too great a contraction of the hand, and explains the infirmities of this organ, and the contraction of the fingers that have been described.

"The nailer should stand on a level floor, in order that the body may have a solid basis, and a regular point of support.

"The points of the feet should be slightly distant from each other, and a little sloped forward. This is just the contrary of what generally exists in workshops, where the heels finish at length by forming for themselves a hole in the soil, which keeps them beneath the level of the fore part of the feet."

If these precepts were followed, the nailers would no longer be exposed, as they now are, to the incurable deformities, and to precocious infirmities, which arise from their badly-conducted work. Dr. Masson adds to these practical propositions very wise suggestions touching the necessity of not admitting to apprenticeship children under twelve years of age at the least; to render the workshops of the nailers more healthy by cleanliness and better ventilation; to make their food more substantial, their clothing warmer, and lastly, to combat excesses of all kinds, and the prejudices which contribute to ruin their health, and to perpetuate their daily habits.

In our opinion, this remarkable essay should be widely known, as we are persuaded that it should serve as a model of such an important study as professional hygiene, and because it demonstrates in the most striking manner, even in a limited question, how the exactness and the novelty of the recommendations, the spirit of observation, the sagacity of the precepts, may serve with great utility both science and humanity.

On the diseases of the workmen employed in the manufacture of chemical matches, and the laws regarding them.

The study of the diseases to which the workmen employed in the manufacture of chemical matches are exposed, has given rise to very curious observations, although still surrounded with some obscurity.

Doctor Hyfelder, Messrs. Théophile Roussel, Strohl of Strasbourg, Sédillot, &c., have described examples of a very peculiar affection, due to the action of phosphoric vapours, an opinion, however, which has been contested by M. Dupasquier of Lyons.

In examining the accidents which arise to the health of these artisans, in endeavouring to ascertain what are, in the manufacture of matches, the peculiar conditions capable of exercising on the living economy a disastrous influence, one cannot but attach the greatest importance to the emanations of the phosphoric vapours which are continually being given off in variable quantities in all the manufactories where either the mastic of the matches, or the matches already charged with the mastic, are handled.

The careful study of the different parts of the work carried on in the factories, permits it even to be affirmed that the emanations of the phosphoric vapours is the only one that causes the accidents and diseases which afflict so great a number of the workpeople.

That is why it is necessary first to examine the two following questions, viz:—

1st. What are the parts of the manufacture of these matches, which cause necessarily exposure to the phosphoric emanations?

2d. What are the nature and the chemical composition of these emanations?

All the wood work and the manufacture of the boxes generally take place outside the factory; these operations are consequently not concerned in the questions of hygiene and pathology which now occupy us; and as they occupy about half the total number of workpeople employed, it follows that half the number of these operatives are beyond the sphere of action of the causes of insalubrity inherent in the factories.

In the interior of the factories, in admitting that there is a particular locality set apart for each operation, five-sixths of the workpeople may therefore escape the influence of the phosphoric vapours. Thus all the work of filling the presses, which absorbs the four-fifths of the women, may go on in rooms free from the emanations, since dry wood is the only substance they are concerned with.

There remains to examine the workshop where the mastic is made; that where the matches are dipped; the stove-room; and lastly that where the presses are emptied and the boxes filled.

The atmosphere of these various rooms is charged in a more or less intense degree, by the vapours which rise either from the paste into which the matches are dipped, or from the heaps of matches already charged with the phosphoric paste.

The pounding of the materials, and the preparation of the mastic, do not require continuous working: a single workman suffices for those operations; besides, these are frequently carried on in the open air, so that they are not of very great importance in a hygienic point of view. One might almost say as much of the stove work, where the workmen do not work continuously.

But it is not at all the same with regard to the "steepers," and above all, with the work-rooms occupied by the emptiers of the presses, and the work-women who put the matches into packets and boxes. The stranger who enters this part of the manufactories, is struck with the emanations which enhale from them; the transparency of the air there is frequently troubled, particularly in the room where the presses are emptied, and if one remains there some time, a slight cough and burning in the throat is generally experienced. One gets accustomed, however, after a time, to this atmosphere, and the greater portion of the women, as we have been able to assure ourselves, only cough in moist weather, and particularly when the air is not often renewed, and the phosphoric vapours accumulate and become too thick.

These remarks, however, are only exact for those factories in which the work is well divided into distinct workshops.

As to the small establishments, where all is necessarily confounded together, and some large factories where we have all the opera-

tives working together, it is evident that all the operations are nearly equally unwholesome, and that the distinctions established above cannot apply to them.

The composition of the vapours which trouble the purity of the atmosphere in the workshops which we are treating of, has been indicated by Dr. Dupasquier.

He has found that they consist principally of hypophosphoric acid, probably mixed with small quantities of phosphuretted hydrogen. He has also no doubt that phosphorus itself is present in the state of vapour. This it is which shows this fact, pointed out by a manufacturer of matches, viz., that when the workmen who have passed the day in the midst of the vapours of phosphorus, are in the dark at night, the gases which they expel from the stomach become luminous, so much as to cause it to appear as if they breathed flames from the mouth.

The effects of these phosphoric emanations upon the health of the workpeople are:—

1st. Bronchitis more or less severe.

2d. Destruction of the teeth, and necrosis of the jaw bones, &c.

The cough is the pathological phenomenon, the most common and the most easy to point out in the factories of chemical matches; it is also the one that it is the most easy to connect directly with the action of the phosphoric vapours.

In the establishments where the work is better divided, one may assure oneself that the individuals most subject to the cough are the steepers and the women who empty the presses, make up the packets, and fill the boxes. Moreover, as they themselves remark, these women cough most when the weather is damp, and when the air of the workshops is not renewed sufficiently frequently.

We have just said that the cough is a symptom very common among the workmen in matches; we must add, that it is not observed in all. Many say that they rarely or never cough; others that they had coughed during the early period of their entering the factory, but that they had finished by becoming habituated to the atmosphere of the workrooms; the greater part coughed, but only at intervals, and under the circumstances above stated. Many among them attached no importance to this cough, which gave them but slight inconvenience, and was accompanied neither with pain or expectoration. Although we must allow a great deal for the incurable carelessness of this class of men, it appears certain that the irritating action of the phosphoric emanations on the respiratory ducts only reaches great severity in a limited number of cases.

But these cases undoubtedly do exist; they have been observed in an incontestable manner in the hospitals of Paris.

Evidence obtained at Strasbourg by Dr. Strohl, confirms the accounts of the severe attacks of bronchitis above spoken of. This physician reports that the work-women have declared to him "that the phosphoric emanations were very irritating." "A great number of them are seized with a cough, which is sometimes troublesome and continuous enough to oblige them to cease their work."

Dr. Charles Lépine, who has furnished much interesting intelligence concerning the manufactory of chemical matches at Châlons-sur-Saône, in which ten workmen are employed, has remarked that almost all those who work in the large workshop, where the filling and the emptying of the presses take place, as well as the making up the packets, are attacked with a cough more or less intense, but which has not yet caused the cessation of work in any instance.

M. Roussel says, "I have not yet met, in the manufactories of Paris, any cases of real severity; but this ought not to surprise us, and we must not conclude from that that the effects of the phosphoric vapours have not the serious effects that M. Gendrin accuses them of. Patients, as seriously attacked as those of whom the physician to the hospital of "La Pitié" speaks, have necessarily quitted the factories, and are only to be seen in the hospital.

"It is necessary then to ascertain if the number of those whom cough drives from the factories is considerable. From the investigations we have made, we should be disposed to answer in the negative; we believe, at any rate, in the well-arranged establishments, that these cases are not very common.

"Nevertheless, in questioning the work-women, we have ascertained from a certain number of them, that several of their companions had been obliged, in consequence of *neglected colds*, to leave the factory; and in general, they added that these had become consumptive."

Dr. Roussel has particularly remarked a circumstance regarding the health of individuals affected with disease of the jaw bones, which appears to play an important part in the production of these diseases. It is, that in whatever state this disease is observed, the individuals had always several decayed teeth, and that all of them assured him they had had the teeth spoiled a longer or shorter time before the breaking out of the evil, and even in some cases before their entering the factories of matches. It suffices to notice the fact at this moment; the deductions therefrom will be seen further on.

It is worthy of remark, that all the individuals affected, had passed rather a long time in the factories before they were attacked with the disease. The patients of M. Lorinser had sojourned from four to nine years there. Those of Nuremberg had also remained there a long time, and they had worked fifteen hours a day. Those of M. Strohl and Sédillot, and those we have seen, had been at least two years at work.

We have found that the steeping and the other parts of the work which most predispose to cough, are also those which most predispose to diseases of the jaws.

It does not appear that any other organs or functions are interfered with in this kind of work.

Neither the digestive functions, nor the general nutrition, nor the organs of generation appear at all affected.

M. Dupasquier doubts the influence of the phosphoric emanations. He appears to attribute to arsenical vapours the diseases

observed in match factories; but there is nothing to authorize this conjecture, and it is most perfectly certain that the influence of the manufacture of chemical matches is essentially injurious to health.

Hygienic Rules.

The following regulations with regard to the manufacture, transport, and sale of chemical matches have been made by the Council of Health of the Department of La Seine.

Sites of factories.

The buildings intended for these manufactures shall be detached.

The magazines and workshops to be on the ground floor.

The drying and cutting of the wood can only take place in a building separate from all the other work-rooms.

Magazines of raw materials.

The following store-rooms must be separated from each other by a brick wall.

1st. Phosphorus store. The phosphorus must be kept in tin boxes plunged in a reservoir filled with water, and of a size fifty times at least larger than the boxes of phosphorus.

2d. Stores of chlorate, solid gum, glue, prussian blue, and cinnabar. These substances must be enclosed in bottles, barrels, or boxes.

3d. The sulphur must be in rolls, if the sulphurisation of the matches takes place in the same factory.

Isolated distinct work-rooms.

1st. Room for mixing the phosphoric paste. Only enough of the materials of the paste for a single operation must be kept here.

On the floor of this work-room a reservoir, containing at least 250 quarts of water, must be kept, to be ready in case of accident of fire.

2d. Room for powdering the chlorate of potass and the colouring materials. This room must be in the neighbourhood of the last-mentioned one.

3d. Room for sulphuring and dipping the matches. This room must be separate, ventilated, and properly constructed of bricks.

4th. Stoves for drying the inflammable paste. They must be built or lined and arched with bricks; they must communicate at the upper part with a solid chimney, rising above the neighbouring roofs.

The doors of the stoves to be of strong sheet iron in framework of iron, and to open outwards.

The bottom of the stoves to be constantly covered with a layer of fine sand, 4 or 5 centimètres thick.

5th. Room where the presses are emptied. The matches withdrawn from the presses to be immediately packed. This room to have two doors at the disposal of the workmen; the doors to open within.

6th. Room for packing.

Preparation of the Emulsion called Phosphoric Paste.

The addition of flowers of sulphur in the emulsion of the phosphorus is strictly forbidden.

The emulsion is to be prepared in this manner: the solution of gum is to be brought, having been warmed in a neighbouring room to 75° or 80° cent.; this solution is to be poured into a copper matrass, solidly fixed in the circular opening of a table or dresser.

The melting and dilution of the phosphorus to take place in small quantities, added successively in the matrass, till the gummy solution fills the vessel two-thirds.

The beating is not to be commenced until after the cessation of the sparks produced by the phosphorus, that is to say, when the temperature of the mixture has descended to 60° cent.

Powdering the raw materials.

The chlorate, if employed, should be steeped in a solution of gum before being submitted to powdering.

The colours, resins, &c., shall likewise be powdered separately with the same precautions.

Sulphuring and dipping.

The furnace for melting the sulphur, and for heating the ends of the matches, must be isolated; the heat to be transmitted by means of a water bath containing a solution of chloride of zinc, or of a sand bath.

The temperature of the liquified sulphur must not be carried beyond 140° centésimaux.

A cover, easy to put on, which will allow of the closing of the boiler, and to stifle instantly the fire which would seize on the sulphur, in case of the accidental contact of a burning substance, must be used.

Drying the inflammable paste.

The presses for holding the matches must be of iron or sheet-iron.

The cushions separating each row of matches may be of card-board and wool joined by glue.

The door of the drying house to be kept open all the time of work.

The warming of the drying-room to take place by means of hot water. The fireplace to be external

General Measures.

Every evening the débris of the matches to be burnt in small portions. The fireplace for these burnings to be placed in an angle of the wall of the courtyard; and if this is impossible, the débris to be transported in covered vases to a locality where these precautions are practicable.

After the workmen have left, all the parts of the fabric shall be visited; the floors to be swept clean.

The fires shall be extinguished, and all the hearths and stoves shut, either with sheet-iron doors or with bricks.

No stores of wood, paper, cardboard, sulphur, or other combustible matters can be kept in the workshops or drying rooms.

Packing and Sale.

Matches, inflammable by friction, shall be delivered in closed envelopes of wood, pasteboard, or tin.

All manufacturers and dealers are prohibited from fastening up the said matches in packets packed in boxes containing above 400 each.

On the diseases of shoemakers.

The occupation of a shoemaker is one of the most painful and laborious among those carried on by sedentary artizans. It is exercised frequently in unhealthy workrooms, and exacts a position and movements which leave on different parts of the body indelible traces.

Perched from morning to night upon a stool, the body bent in two, they exert great force in laboriously sewing leather. Consequently the right hand, the thumb and index finger of which draw out the thread in order to cover it with wax, have the pulp flattened; the pulp of the thumb is rather pushed on one side. The fold which separates the second from the third phalanx is cut by the thread, and presents a deep crack, the borders of which are hard and callous.

On the left hand, the pulp of the thumb, also pushed aside towards the index finger, has the form of a very broad spatula, and the nail is considerably thickened and hard; its free edge is toothed, frayed, scratched, and sometimes deeply grooved by injuries of the awl.

Moreover, the pressure of the last on the chest causes, in spite of the interposition of a plastron of leather, a sinking in of the chest at the level of the chondro-sternal articulation of the sixth, seventh, and eighth ribs, immediately below the ensiform cartilage. The sternum shows at this spot a hollow, deep, regular, circular, clearly described, and which is not accompanied with a general malformation of the entire thoracic cavity. Lastly, one of the thighs upon which is fixed a plug of leather presents a flattening of the skin, and particularly of the hairy bulbs, which become obliterated, so that this part often appears quite smooth.

The sedentary position, and the unwholesomeness of the workshops or rooms where the journeymen shoemakers work, add to the causes of physical deformity we have just enumerated, to produce in these artizans certain constitutional affections, which are aggravated by their hereditary tendency. Rickets and scrofula are strong instances of this.

Corvisart and Mérat look upon shoemakers as liable not only to chronic inflammation, but also to cancer of the stomach. Stoll adds hemorrhage of the lungs. Turner Thackrah attributes to their fatiguing position a troublesome compression of the bowels, and especially of the stomach and liver, and as a consequence, constant disorders of the digestion and circulation, and a marked impoverishment of the blood. He lays it down as a fact that few artizans of this class live long.

It must be acknowledged that few occupations have been the object of less improvements, and that those improvements even that have been proposed have been received with the most deplorable indifference by the artizans to whom they were addressed. Thus there has been invented in England a kind of bench, which, by permitting the workman to work upright, delivers him almost completely from the inconveniences of the position and the motions which now so greatly incommode him: but this invention has borne no fruit. A more radical modification would have consisted in the application of machines for the manufacture of boots and shoes, as proposed and put in work by M. Brunel. There is, besides, much progress to be made in giving to the shoes actually worn the qualities in which they are so deficient, and especially a form better appropriated to the structure and mechanism of the human foot.

On certain deformities to which tailors are peculiarly liable.

THERE are few occupations in which, in addition to the acci dents produced by the sedentary nature of their employment, physical deformities so decided and well marked are met with as in tailors.

In consequence of the particular attitude in which they work, constantly sitting, the legs crossed, and the body bent forward, there arises on both sides:

1. A red swelling, more or less voluminous, sometimes as large as a walnut, and very soft, on the outer ancles;

2. A second tumor, resembling, but smaller than the former, on the outer border of the foot, at the level of the tarsial extremity of the fifth metatarsal bone;

3. Lastly, a reddish-coloured hardness on the small toe.

In young workmen, who have not been very long in the trade, instead of tumors, we find simply a bright redness, very circumscribed, accompanied with slight swelling.

Besides these characteristic deformities of the lower extremities, tailors present at the lower portion of the chest a considerable depression, caused by the curving in of the chest.

This depression, which may be compared with that seen in shoemakers, is, however, very distinct therefrom.

Placed lower down, *beneath* the ensiform appendage, it is not limited to one point of the sternum, but results from a deformity of the whole of the thorax.

On the diseases of carders of flax, hemp, wool, silk, &c.

The carder is the workman employed in *carding*, the operation certain filamentous matters are made to undergo, in order to render them fit to be spun, or even simply to extract foreign bodies from them, and to give them elasticity. It is on flax, hemp, wool, and silk that this industry has to work.

Carding may be done either by hand, by means of two *cards* with handles, or by means of sticks with which they strike the wool, spread out on screens; or lastly, by means of mechanical apparatus.

The inconveniences arising from cardage have been thus summed up by Dr. Boileau de Castelnau, in a report addressed to the Minister of the Interior, on the influence of the cardage of silk on the health in the prisoners of Nismes.

"Position, constantly sitting or standing for the pressers; forced and continuous exercise of the upper extremities; continual inhalation of vapours and particles of animal matter; obligation to keep the hands at the elevation of the head.

"To these must be added other ordinary causes of insalubrity, as damp and inadequately ventilated workrooms, temperature hot and stifling, the transition from an atmosphere of this kind into a sharp and cold air."

Fourcroy and Sarthe class the profession of wool-carder among those which injure health by the excessive exercise of certain parts, (the upper extremities,) and by deficient exercise of other parts, (the lower extremities), by the particles of soap which the workmen inhale, and by the animal molecules which enter the aerial passages.

It is especially the noxious substances which pollute the atmosphere breathed by the workmen in carding, which have fixed the attention of observers. Morgagni, Fourcroy, Ramazzini, have reported numerous examples of severe or mortal affections developed under such an influence.

Cruel maladies, say the authors of the "Topographie de Nismes" afflict the "bourretaires" or carders of floss silk. All are exposed to weakening and to œdema of the lower parts of the body, to chronic pains of the arms, the shoulders, and the chest; many are subject to the most painful affections of the eyes, such as acute inflammations, obstinate ophthalmia, &c.; the greater number are threatened with long and fatiguing coughs, with asthma, spitting of blood, and pulmonary consumption, &c. To these must be added cutaneous diseases, due to the irritating and contact of dirty substances which fill the atmosphere of the carding rooms, and which attach themselves to the skin and the clothes of the workmen.

Many physicians, practising in localities where the industry of carding occupies many arms, give the following as the portrait of the journeyman carder.

One recognizes the carder by his countenance, pale, etiolated, wan, rather bloated than fat; by his red eyes, and his almost

constant cough. The maladies to which he is subject are, chronic ophthalmia, hypertrophy of the heart and its consequences, consumption, varices, atonic ulcers. The most skilful and intrepid artizan is forced to discontinue his trade at the age of 48 or 50. Carding, besides, in many localities, is only carried on during three or four months of the year, from November to the commencement of March, and alternates with field labour.

The above observations apply more or less directly to the different kinds of carding. We should add to the circumstances we have alluded to, that in certain cases the molecules which spread in the air get accompanied with certain substances which add to their injurious effects. Thus Fourcroy has seen, in the case of a woman employed in carding a mattress belong to a brazier, particles of copper that the wool of the mattress contained, introduce themselves into the bronchial tubes and give rise to serious symptoms of poisoning by copper.

M. Boileau de Castelnau, who has studied with care the influence of silk-carding on the health of the prisoners of Nismes, has certified, that the carders have contributed more entries to the infirmary than all other professions united; that if this profession has given fewer deaths, it is, that before dying the carder has changed his occupation, because he had no longer strength to continue it; that half the men who entered the infirmary were or had been carders; that consequently this occupation was more injurious to health than the others.

The industry of carding reclaims, therefore, imperiously the employment of machinery, in order to remove the operatives from a fatal influence. Nevertheless, it is possible to diminish these dangers by certain precautions.

Remedies.

In some parts of the Cevennes the carders cover the mouth with a handkerchief. In the work-rooms of Piedmont screens of canvas are suspended horizontally at a certain height, between the ceiling and the heads of the workmen, to catch the dust disengaged by the carding. These screens must be removed every night and carefully cleaned. It is of importance that the work-rooms should be lofty, large, ventilated by means of broad windows, close to each other, and placed opposite to each other. These windows must be opened on the side opposite to the direction of the wind. Fourcroy advises the workmen to place themselves with their backs to the wind, so as not to swallow the murderous dust. Great cleanliness of face and hands, and the use of a blouse and hat of linen or canvas, which should be removed when the day's work is finished, would tend to prevent the diseases of the skin that the contact of animal dust as well as vegetable so frequently determine.

On disinfecting and the action of disinfectants.

Disinfection.

THE air is said to be *infected* when it contains odorous and unwholesome principles, such as sulphuretted hydrogen, ammonia, or carbonate of ammonia; or when the proportion of its normal constituents other than oxygen, as nitrogen or carbonic acid, is augmented; or again, when it contains substances almost unknown in their nature, but whose existence is not the less certain, and which are known by the name of miasm, emanations, or effluvia. The term "disinfection" is given to the operation by the help of which one endeavours to destroy the noxious qualities of the air; and the substances made use of for this end are called "disinfectants." This name, however, must not be given to substances which only act by masking the bad odours of the air, and which belong to the class of "fumigations."

The substances which truly deserve the name of disinfectants are, according to M. Fermond, those which, by some chemical action, destroy or neutralize the foreign materials which injure the wholesome properties of the atmosphere.

It may be established generally:

1st. That the acids (nitric, hydrochloric, &c.) act frequently with much efficacy in neutralizing ammoniacal animalized matters, or even in chemically modifying these matters. They have been frequently employed with success in purifying large inhabited buildings.

2d. That chlorine and the alkaline hypochlorites, the best disinfectants known, decompose all organic matter by seizing their hydrogen.

3d. That the alkalies (ammonia, quicklime, potass, soda, &c.) act particularly by neutralizing acids, as carbonic, hydrosulphuric, and especially the organic acids whose nature is as yet but little known.

4th. That nitrous and sulphurous acids produce, in many cases, excellent effects in disoxygenizing organic substances.

5th. That, in all cases, ventilation is an indispensable complement of all disinfection.

It is usually to chlorine that recourse is had to disinfect hospitals, although either nitrous acid or nitrous gas may be employed.

Earthen saucers, in which has been placed previously a mixture of *four parts of sea salt* and *one part of peroxide of manganese*, on which is poured every now and then two parts of sulphuric acid diluted with an equal weight of water, are placed here and there.

The saucers are placed on hot cinders, so as to keep up the disengagement of the gas during several hours.

When it is time to wash the bed frames and the walls, chloruretted water, formed by mixing one part of dry chloride of lime with twelve of water, allowing time to deposit, and then straining it, must be used for that purpose.

The process for obtaining chlorine above given cannot be made use of where invalids are present, on account of the irritating

action of the chlorine on the respiratory ducts. When it is desired to disinfect wards filled with patients, we must be satisfied with placing at small distances from each other open vases containing a concentrated solution of chloride of lime, so as to obtain a feebler disengagement of chlorine.

The disinfection of drains consists, properly speaking, in a good use of ventilation and irrigation. The chlorides or the disinfecting fluid of M. Paulet, may also be usefully employed.

It happens sometimes that depôts of putrid matter, as manures and cesspool matter, disengage, especially when they come to be stirred, a fetid odour very difficult to be borne. It is sufficient then to water them with chloride of lime suspended in water, to cause all odour to disappear. The same substance may be employed in dissecting theatres, and in rooms of exhumation.

Charcoal is also employed in analogous circumstances; but it acts then more as an absorbent than as a chemical agent. In Mayenne, the agriculturists understand well how to utilize fæcal matter to manure their fields, and with this object, they dry a quantity of earth, generally peat, reduce it to powder, throw it into the privies, stir it, and thus obtain a pulverulent matter completely disinfected.

Clothing, counterpanes, mattresses, impregnated with infected odours, or which are supposed to be contaminated by noxious miasmata, should be, according to the process recommended by M. Chevallier, suspended in a wardrobe where plates containing dry chloride of lime are placed.

Or they may be left with a solution of chloride of lime, or better still, if they are woollen materials, with an aqueous solution of chlorine, alkalies having the property of attracting and even of dissolving wool.

As to the disinfection of air vitiated by principles whose nature is unknown, means purely empirical must be resorted to, whose efficacy is at least doubtful: as acid or alkaline fumigations, chlorine or alkaline hypochlorites, aromatic or resinous fumigations, fires lighted in open air, gunpowder exploded.

We have spoken above of the use of charcoal for disinfecting fæcal matter. In fact, placed in a condition of suitable subdivision, charcoal completely destroys the odour of putrescent organic substances. Animal black or charcoal is particularly extolled for this use; but it is not only in this form that charcoal is employed as a disinfectant.

When charcoal at the ordinary temperature is placed in contact with water, some organic substances in a state of decomposition which give it an infected odour, it can so completely destroy this odour, that if the water contained no saline substance to give it a particular taste, it would become perfectly drinkable; but after a certain time, it might take on again a repulsive smell, if the organic matter contained in it underwent a fresh change which would give rise to the formation of gases of the same nature as the first, and that the charcoal was not in sufficiently large proportion to remove entirely.

It is on this property that is founded the use of charcoal for purifying the water meant to serve as drink, or to preserve it during sea voyages.

On the dwellings of the labouring classes in manufacturing towns, as regards their sanitary conditions.

No one can be ignorant how great are the sacrifices that the labouring man and the poor man must make for their dwellings. Whilst all other articles necessary for their preservation have greatly diminished in cost, whilst food and clothing have undergone a great fall in price, the expense of lodging in our industrial towns has risen enormously, and threatens to rise still more; and although wages have much increased, it is only with very great difficulty that the workman can support so heavy a charge.

The problem that the workman has to resolve is, how to provide for the necessities of habitation with the least possible sacrifice.

If the care of his health and that of his family occupies him but little, because, robust and healthy up to that time, he believes they will remain so; if he is ignorant of the causes of sickness and infirmity, that a narrow, damp, confined dwelling conceals; if, a stranger to large towns, he enters one with numerous and healthy, strong children, that the mephitic atmosphere of a manufacturing town has not yet emaciated, he will bury this fine family at the bottom of a narrow court that the sun never brightens, and on which weighs incessantly a fetid and stagnant atmosphere; lucky if, to save a few pence per month, he does not descend into a hideous cellar—a living tomb.

But if the poor man and the artizan show but little care for the preservation of their health and that of their family, it is the duty of those in authority to look to the future generations of the people. The interest of governments as of industry requires it.

Causes of insalubrity in the dwellings of the poor.

There are two distinct divisions to make in lives of artizans: 1st. External life, or that which a man passes out of his habitation; 2d. Internal life, that is to say, that of his family—his home. This latter is the object of our present study.

The time passed at home varies for different members of the family. The infant, up to a certain age, scarcely ever quits the house. Arrived at youth, his time is divided between the school or the workshop and home. The mother of the family is almost always at home, and therefore the influences resulting from the insalubrity of the house act upon her with great energy; and whilst the father and the grown-up children experience the good effect of fresh atmosphere in their entrance to and their leaving the workshop, the mother, constantly subjected to the action of a concentrated and impure air, becomes emaciated, vegetates miserably, and often bears the stamp of premature old age.

As to the aged poor man, a being worthy of the greatest solicitude and compassion, his latter years, which are often but a slow

agony, are passed in the house. He lives almost without air and without light, hidden in a dark corner, waiting, in company with his numerous infirmities, for an epidemic disease or an acute affection to carry him off in a few days, incapable as he is of resisting the attacks of the one or the other.

For all classes and ages, there is the long sojourn of the night, the time of sleep occupying nearly half the existence of man.

There are three principal causes of the vitiation of the atmosphere of our dwellings. They are—

1st. Respiration.

2d. The exhalation which takes place from the surface of the skin by insensible perspiration.

3d. The excretions.

The two former have been long studied, but the effects of the latter have not been so minutely inquired into as the great importance of the subject demands.

We propose to give it some consideration in this place.

The greater part of the habitations occupied by the poor have privies common to all the inhabitants of the house.

Some are kept cleanly enough; there is a sort of surveillance over them, and they are pretty frequently washed; but these are but a small proportion, and the others, situated ordinarily at the bottom of narrow *and dirty yards,* add materially to the other causes of a poisoned atmosphere. They are but rarely washed; remains of animal and vegetable matter are thrown there daily by the numerous inhabitants of the neighbourhood, and these different matters thrown in give rise to a disengagement of gaseous products more deleterious and more infectious than those produced naturally.

The gases furnished by the secretions of man are of several kinds; and as the effects that these produce are various, it is necessary to determine their nature, and to characterise their action separately.

1st. The peculiar odour that the excretions of man exhale, shortly after their emission, is produced by the presence of sulphuretted hydrogen gas.

2d. After these matters have been evacuated some time, and when they are mixed with a certain quantity of urine, this liquid, by its decomposition, gives rise to a disengagement of ammoniacal gas; and the mixture of these two products gives rise to a new combination,—hydrosulphuret of ammonia, the effects of which upon man, when this gas is introduced into the respiratory passages, are much more serious than the inspiration of the two former separately.

The former gas may be perceived in apartments where the excrementitious matters have sojourned some time; but the hydrosulphuret of ammonia requires for its production a longer time, and it is only met with in dirty privies, the cesspools of which are badly constructed, and which, too small for the population they are intended to serve, are filled too full and *emptied too rarely.*

Several other mephitic substances, pernicious to mankind, are

met with in these places, when the air is not properly renewed; but only two kinds of mephitism have been distinguished. The first is produced by the hydrosulphuret of ammonia. This is the most common and the most terrible. It is in the inside of the privies, and by the agitation caused by their evacuation, that the most serious and sudden accidents are produced; and then also the perfidious effects of this gas may make themselves felt beyond a certain distance. In some cases, an instantaneous death has followed the respiration of this gas; an extreme irritation has seized the eyes and the throat, and has brought on suffocation.

The second species of mephitism is produced by the presence of too great a quantity of nitrogen. This gas is unfit for respiration. The chest is oppressed by it, its movements become progressively slower and more difficult, and death takes place by asphyxia. In the neighbourhood of privies and cesspools this gas scarcely ever produces effect rapidly fatal, because, whatever may be the amount of the concentration of the air of the neighbouring places, it will be always in sufficient quantity to allow respiration to take place. However, in all places where nitrogen exists in excess, it always produces a certain difficulty of breathing.

It is a mistake to suppose, as is generally done, that if a candle will burn in an atmosphere in or surrounding a privy, that it is therefore fit for human respiration. This gas, sulphuret of ammonia, will permit bodies in ignition to continue burning almost as freely as in common air, and still be mortal to man.

The only gaseous substances for which a lighted candle is a test are carbonic acid and nitrogen. The latter is more frequently met with in privies than the former, and it is also the gas which more often vitiates in the abode of man the concentrated air breathed there.

Vitiation of the air by the domestic animals which live near man.

It is not rare to find, in the habitations of the poor, animals brought up close to him, sometimes in considerable number. This is more particularly the case in the houses of the poor that surround towns. Sometimes they are birds, whose cages cover all the walls of the narrow dwelling, sometimes dogs or guinea pigs, but the animals we generally meet with are rabbits. Generally, a very considerable profit is derived from these animals. It is unfortunately generally the very poorest and most insalubrious homes where they are found in the greatest number.

It is important that the labourer should be informed of the dangers to which he exposes his family in preserving such guests in his house.

The respiration of animals enclosed in a limited space changes the air in the ratio of the oxygen they absorb. This amount is not equal for all, and observation has proved that birds consumed a much greater proportional amount of oxygen than other animals larger in size.

The exhalations from the surface of the body of animals, their insensible transpiration, their excrementitious matters, frequently left to accumulate in a corner on a damp soil, these are additional causes of the vitiation of the atmosphere.

Serious consequences frequently arise to the health of the poor and their families from this state of things.

Influence of light and warmth.

Another condition absolutely essential to the preservation of the health of man, is the influence of light.

The action of light on man is incontestable. The continual enjoyment of its beneficent influence renders us, in some measure, indifferent and insensible. To appreciate its effects, however, it is enough to consider what effects are produced by obscurity on all beings endowed with life. Vegetables withdrawn during a sufficiently long time from the action of light grow with slowness, and are weak; their softer tissue becomes impregnated with a larger quantity of water, and has a tendency to become dropsical. All animals, as well as man, suffer from privation of light. Every one knows the miserable and wretched life of miners, the smallness of their size, the deformities of children occupied in mines, the extreme pallor of their countenance, the meagre appearance, and their frequent early-developed dropsy.

Those inhabitants of manufacturing towns that live in cellars participate, to a certain degree, in these results.

Heat is necessary to life. Man possesses within himself the faculty of developing the amount of caloric necessary for his preservation; but as he is unceasingly exposed to exterior causes which tend to modify that amount, he also possesses the force of reacting against the influences which tend to lower the temperature, in the same manner as, when exposed to the action of a high temperature, he can diminish the effect that it exercises on him by producing on the surface of his body a transudation which is continually evaporating, and thus moderate the enervating influence of this cause.

But this faculty of reaction has its limits, and man is provided with artificial means for satisfying this want. Besides, he does not possess at all ages this force of reaction in an equal degree; if it is powerful in the adult, it shows itself, in the extreme ages of mankind, in the infant and the old person, enervated, insufficient, and the action of artificial heat is then necessary.

In the narrow and confined habitations of the poor, heat and cold often make themselves felt in extreme degrees.

The subterranean and slightly elevated habitations generally suffer the influence of cold, increased still further by humidity. If we rise higher, we see the influence of the cold in winter become less sensible, but there is this result ordinarily, a greater and more fatal concentration of the air in the habitations; whilst, during summer, an excessive heat forces the inmates to seek for a renewing of the concentrated air by opening every issue to it.

Effects of unwholesome habitations.

The causes of insalubrity which are met with in the homes of the poor do not act with equal force on all ages.

One cause of this inequality of influence is the length of time passed in the abode; but there is another quite as important, it is the inequality in the force of resistance in individuals of different ages.

Infancy and old age are the ages the most exposed to feel the evil effects of insalubrious habitations, on account of the longer time passed in them; and it is also at these two epochs of life that we find an equal impotence to resist the enervating influence of the preceding causes, on account of the weakness of organization on the one part, and of the exhaustion of our organs on the other.

The adult resists better the influence of these causes, because his absences for his work allows him to feel their attacks less, and the energy of action with which his organs are endowed permit him to struggle against them with advantage. But the adult female, who possesses also this force of resistance, often struggles successfully against the influence of insalubrious habitations; however, as this cause acts more on her than on the adult man, she succumbs less often than the child and the aged, but more frequently than the adult male.

We will now consider the effects of the respiration of an impure air on the inhabitants of the dwellings of the poor.

The different causes of the vitiation of air above described act always either by decomposing the respirable air, so as to leave only products unfit for the support of life, or by adding to the air gases which mix with it, and which, introduced into the respiratory ducts, become noxious to life there. Sometimes, in consequence of the unequal weight of the gases mixed with the air, a displacement ensues; a gaseous product, unfit for respiration, takes the place of the air, and gives rise, in those who absorb it, to phenomena analogous to those which produce a commencement of asphyxia. Such is the action of carbonic acid gas when found in any notable quantity.

Lastly, at other times, the gases mixed with the atmosphere exercise a double action on it; one portion of these gases is employed in decomposing the atmosphere, while the other portion remains mixed with it, and determines, in those who breathe it, a violent irritation.

Thus, we have an insufficient quantity of respirable air, and a mixture of gases unfit for respiration.

Such are the two conditions which give rise to the mischievous consequences described.

The most severe, although happily rare, accident that arises from the state of things above described is *asphyxia*.

Another, much less rare, is to find in the dwellings of the poor, patients affected with diseases of the chest, and whose difficulty of breathing is still more considerably increased by the concentration and vitiation of the air that surrounds them, and I have no hesi-

mation in asserting that the death of these unfortunates is much more rapid, and takes place also by a kind of asphyxia.

There is another disease also very frequent amongst our artizans, and which renders them, before old age comes on, infirm and incapable of work; I mean *asthma*. Certain sorts of work bring on this very painful and troublesome complaint more rapidly than others. Persons engaged in the earlier preparations of cotton are peculiarly liable thereto.

Many asthmatic patients die of asphyxia when seized with a a paroxysm in their dwellings, at a moment when the air that surrounds them is more than usually vitiated or rarefied.

Diseases of all kinds attack the poor man the more rapidly that his dwelling presents more numerous conditions of insalubrity and infection; as to the epidemic affections which visit us from time to time, it is now well-known that the parts of a town the most populous, the poorest and the most unwholesome, are those where these diseases find the greatest number of victims, where they, as it were, more specially take up their abode.

Man does not live wholly on bread, he lives also on air; these are two aliments equally indispensable, and without which he cannot long sustain life. If the first can sometimes be waited for a short time, the other is incessantly and absolutely necessary, and if its absolute privation gives instantaneous death, dispensed with parsimony it produces effects so much the more pernicious as its quantity is less.

The habitual obscurity of the habitations of the poor is, besides, the cause of a great number of the maladies which so frequently attack infancy. It is to this cause particularly that is owing among poor children the predominance of the lymphatic temperament, the susceptibility of the mucous membranes to catarrhal affections, poverty of the blood, extreme flaccidity of the tissues, swellings, deviations of the osseous system, and as consequences of these different causes, the frequency of scrofulous diseases, scurvy and rickets.

All who are much in contact with the poor of our populous cities well know how frequent are these different diseases among the children.

Among all the maladies which attack the poorer classes in our large towns, consumption partakes with scrofula the sad privilege of seizing on a great number of victims.

Remedial Measures.

Cellars.

All cellars situated in culs-de-sac, or in very narrow and infected streets or courts, should be discountenanced by authority.

Wherever possible, two openings should be made in opposite walls in every cellar, one of which may be the door, and this should be as large as possible.

Every cellar should be provided with a window to open as widely as possible.

The establishment of a chimney in all inhabited cellars should be rigorously prescribed.

The internal walls of all cellars should undergo frequent lime-washing.

Courts.

Whenever an opportunity presents these should be widened.

The open channels which so frequently traverse their centres should be abolished, and the drainage accomplished by means of subterranean pipes.

No accumulation of dung or ordure should be permitted.

Frequently washing with large quantities of water, the channels and surfaces of the courts, and the privies, imposing on the proprietors the necessary repairs of the house property from which they draw rent; and making proper regulations that houses in narrow courts shall not be built of too great a height: such are the most important points which more especially call for the directions of the authorities anxious for the health of the inhabitants of towns.

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ABSTRACT OF REPORTS

ON THE

TRADE OF VARIOUS COUNTRIES AND PLACES,

FOR THE YEAR 1854,

RECEIVED BY THE

BOARD OF TRADE (THROUGH THE FOREIGN OFFICE)

FROM

Her Majesty's Ministers and Consuls.

Presented to both Houses of Parliament by Command of Her Majesty, August, 1855.

LONDON:
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1855.

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ABSTRACT OF REPORTS

ON THE

TRADE OF VARIOUS COUNTRIES AND PLACES,

FOR THE YEAR 1854.

BRAZIL (MARANHAM).

Copy of a Despatch from Mr. Consul Ovenden, Her Majesty's Consul at Maranham. Dated June 2, 1855.

A gold district having been discovered in the interior of this province, and several of the leading English newspapers having inserted articles which may induce persons to emigrate hither from the United Kingdom, I consider it my duty to make a report on the subject to your Lordship, and briefly to point out the inexpediency of such a step.

The gold district lies in the valley of Maracassumà, an uncultivated and wild part of the province, where the necessaries of life are to be obtained with difficulty, and where the climate is particularly fatal to the European constitution; added to this, there is a scarcity of water, and the heat of the sun is so great, that only persons of negro or coloured blood can labour under it.

A company has succeeded in obtaining a monopoly, and any person working on his own account would probably meet with hindrances from their local agents. I do not augur favourably as to the success of this company, from the fact, that their shares have not found a market in this province but in the southern ports, where people cannot form so correct an opinion as to the probable success of the undertaking.

I do not think the richness of the gold district is overrated by the English papers: the gold is found in considerable quantities on and near the surface, chiefly in the form of dust and very small nuggets, and some specimens sent to England by Messrs. Bingham & Co., merchants, residing here, showed a degree of purity above standard: the soil is chiefly a ferruginous clay.

BRAZIL (PARA).

From the Report of Mr. Consul Vines on the Trade of Pará, 1854.

The Trade Returns of Pará for 1854, when compared with those of 1853, show an increase: 25 British vessels, with an aggregate tonnage of 4,851 tons, having been employed; whereas in 1853 the amount of shipping was but 17 vessels, of the total burden of 3,308 tons, showing an increase of 47 per cent. The value of the imports from the United Kingdom to this port was, in 1854, 118,266*l.* in British vessels, and 10,500*l.* in foreign vessels, making a total of 128,766*l.* against 92,720*l.*, the value of the imports for 1853, making an increase of 38⅞ per cent. The value of exports in British vessels was 137,013*l.*; in foreign vessels 24,058*l.* in 1854; giving a total of 161,071*l.*, while the exports of 1853 were valued at 90,117*l.*, showing an increase of 78 per cent.

114 vessels of all nations, with an aggregate tonnage of 19,777 entered this port against 113 vessels of 18,370 tonnage for 1853. The value of the imports for 1854 shows a

slight decrease of that of 1853, while the value of the exports for the first-named year shows a considerable increase on that of the last-named. The value of the imports for 1854 was 367,906*l.*; that for 1853 was 392,676*l.* The value of the exports for 1854 was 662,336*l.*; that for 1853 was 516,651*l.*, an increase of 28 per cent.

In the early part of 1854 considerable inconvenience was experienced by merchants, owing to the delays occasioned by the vexatious system of quarantine laws enforced at this port, which required that vessels arriving from Europe and North America from ports affected with cholera, regardless of the length of their passage or of the healthy state of their crews on arrival, should be placed in quarantine for twenty days. This regulation, however, was but of short duration, and has been so far modified as to remove all just cause of complaint.

Vessels which have been thirty days at sea, and arriving with their crews free from all contagious diseases, are not subject to quarantine. This, as far as vessels sailing from any port in the United Kingdom, amounts to an exemption from quarantine, as the average passage exceeds the period named.

In my Trade Report under date the 28th of January, 1854, accompanying the Trade Returns for 1853, I had the honour of stating to your Lordship that the Brazilian Government, in pursuance of their then policy of discouraging all enterprise tending towards the free navigation of the Amazon or settlement of the country on its banks, had granted in 1852 to a Company at Rio de Janeiro, for a period of thirty years, the monopoly of the steam navigation of that river in the Brazilian territory. I am glad now to be able to inform your Lordship that a more liberal spirit has shown itself, and that the Imperial Government has granted a compensation to the Amazon Steam-boat Company for withdrawing their charter, and has declared the Amazon with its tributaries open to all vessels under the Brazilian flag.

The Reports published in some of the newpapers of the United States of America, of the existence of gold in large quantities on the banks of the Upper Waters of the Amazon, attracted the notice of several adventurers, who, if their own statements can be relied on, were experienced miners both in California and Australia, and they came from the last-named country through Peru, down the Amazon, provided with money, and with the necessary implements to aid them in their search for gold; and so unsuccessful was their enterprise, that they arrived in Pará in destitution, proving, as far as their experience went, how exaggerated were the newspaper reports.

Gratifying as it is to report the steady and progressive prosperity of the Province of Pará, it is painful to have to record the prevalence of yellow fever and other diseases during the past year, proving fatal to so many, especially amongst those lately arrived in Pará.

The sanitary condition of the city must be seriously affected by the insufficient supply of wholesome food, and the miserable substitute for it of dried salted fish, on which the larger portion of the population subsist.

The city obtains its supplies of beef (the only fresh meat with which the city is supplied) from the island of Marago, where there are extensive cattle estates, but so few have been the arrivals of beasts thence the last year, that in November the Provincial Government raised the price of meat one vintem per pound (about a half-penny), hoping to induce the cattle owners to supply the market more liberally; but this has failed, and in the absence of any government inquiry to ascertain the cause of this failure, it is believed the deficiency of cattle arises from the great mortality, as well amongst the cattle on the island as amongst the horses employed in driving in the herds, for shipment to the market at Pará.

BREMEN.

From the Report of Mr. Vice-Consul Pearkes on the trade of Bremen within the Consulate-General of Hamburgh, for the year 1854.

A final decision has not hitherto been found respecting the junction of this city with the Prussian Customs Union (Zollverein); and it may be presumed that in the present excited and undetermined state of politics in Germany, negotiations of such importance will be deferred until a certain degree of tranquillity and understanding is restored.

The commercial intercourse between Great Britain and this port continues to be extensive, and the increase is without doubt materially promoted by the regular run of British steamers between London, Hull, and the river Weser; the number this year from London was 39, with the tonnage of 11,405 tons; and from Hull 21, with a burden of 3,697 tons, which is a total increase of 4,966 tons when compared with 1853.

The tonnage of British vessels arrived here this year in the indirect or carrying trade, exceeds that of the preceding year by a few hundred tons.

About 55 Bremen and other vessels, of the tonnage of 12,500 tons or thereabouts, sailed from hence this year for British ports, for the purpose of completing their cargoes with British manufactures or produce; for their further destination to transatlantic ports; and in a few instances, for the fulfilment of the charters made to load coals, iron, &c., for the East and West Indies.

The variation in the number of arrivals and departures to and from this port in the present year, when compared with 1853, appear, in regard to the principal countries, to have been as follows:—

	Arrivals.				Departures.			
	1853.		1854.		1853.		1854.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
Great Britain ...	533	79,722	523	82,123	462	59,681	478	69,212
Denmark	102	2,705	137	3,331	194	6,410	208	7,080
Holland	136	9,206	189	11,767	162	7,155	185	8,274
Russia	106	13,398	26	3,065	156	20,685	23	3,024
Ditto, Black Sea ...	18	4,018	28	8,569	17	3,945		
Norway	124	7,042	143	9,198	151	11,869	156	11,480
U. S. of America ...	134	73,908	198	110,601	279	134,226	362	171,976

The principal articles of import from Great Britain continue to be manufactures of different kinds,—iron of all descriptions, copper and muntz metal for ship-building and other purposes, coals, herrings, machinery, linseed-oil, train-oil, and also all kinds of colonial East and West India produce.

The principal and most important articles of commerce for Bremen are coffee, dyewoods, cotton, grain, hides, iron of all descriptions, linen, oil of all kinds, linseed and rapeseed, rice, rum, spirits, sugar, tobacco, whalebone, and wine. Bremen has been for several years, and continues to be, one of the principal, if not the most important market, on the continent for the sale of the different descriptions of tobacco, the import of which, from North and South America, as well as other States, has been again this year to a great extent, and when compared with 1853, shows an increase of about 8,000,000 lbs. Cigars are extensively manufactured in this place, though certainly with a great decrease since the accession of Hanover and Oldenburg to the Prussian Zollverein; the fabrication of this article being much favourized in those States by the heavy import duty. The quantity of German cigars exported from hence in 1853 was 176,567 mille, and in 1854, 180,955½ mille.

Commerce in general has experienced various, and in

some instances great fluctuations, during the year, in the value of some articles, but principally in regard to hides, the different kinds of oil, rice, tallow, as well as other produce of Russia, and tobacco from Hayti and Greytown. In the import of ashes, pot and pearl; beef and pork, brimstone, barley, wheat, cotton, dyewoods (fustic and logwood), hides, dried and salted; oil (cocoa-nut, South Sea, and turpentine), pimento, rice, rosin, rum, rapeseed, sugar (raw and refined) tallow, tea, tobacco, wood, cedar and mahogany, there has been an increase, and in some articles even important; but, on the other hand, a decrease in cocoa, coffee, dyewoods (quercitron and redwood), currants, raisins, herrings, indigo, oil (linseed, palm, and rape), the different kinds of fish or train-oil (with the exception of South Sea), pepper, and wine.

The present political state of Europe and the great uncertainty of the important events which may take place in the course of a few months, create great apprehensions with the commercial public of this city, and induce the same to be very cautious in their representations and enterprises. A few failures have occurred here in the course of this year; but no one being of any repute, it may be concluded that the general run of business has been more favourable than otherwise.

The principal manufactures in this city and its territory continue to be soap, sugar, and tobacco, as also several distilleries and beer breweries; there are likewise three iron foundries, a factory of engines and other machinery, regularly at work; a great part of the raw materials required for the same being imported from Great Britain. The high duty on the import of earthenware in the Zollverein being equal, or nearly so, to the first cost in England, has induced some merchants of this city to establish a pottery on the Hanoverian territory, at a short distance from the town; the raw materials are for the greater part imported from Great Britain.

On the river Weser, as well in the territory of Bremen,

as in Hanover and Oldenburg, there are several ship-building yards; and as the vessels built here are considered to be well constructed, comparatively on moderate terms, there is constant employment for the same, not only for Bremen merchants, but also by orders from Hamburgh, Holland, and elsewhere; the generality of vessels built here has been hitherto from 300 to 600 tons measurement, but at present the measurement is increasing to 1000 and 1,500 tons.

No official statement is made at present of the amount of marine insurances effected here, but in the present year they are estimated at or about 6,500,000*l.* sterling, which on being compared with 1853, shows an increase of about 500,000*l.* sterling. The average rate of premium has been about 2 per cent. The Insurance Companies here, as well as the private underwriters, are of great respectability, and are considered to be very solid and prompt, as well as liberal in the settlement of averages. The amount to be insured here on one vessel is about 20,000*l.* sterling.

There is no alteration in regard to the import and export duty on merchandize. Goods arriving here seawards of sale, pay a duty of $\frac{2}{3}$ per cent., and on export $\frac{1}{3}$ per cent.; in both cases on the value declared by the merchant on his burgher's oath, without any control or examination on the part of the Custom House. The existing regulations require the import value to comprise the first cost, freight, and insurance; the export duty is on the cost, with the addition of the charges incurred.

Goods arriving here by land carriage or otherwise, from the inland States, pay no import duty, but one-third per cent., as before stated, on their export, either by land or by water. Goods which on arrival here are declared for transit without a change in the ownership, pay only a very moderate duty, in proportion to the greater or less value of the article, the highest rate being about half a penny per cwt. gross weight, and the fourth, a most inferior class, about one-sixth of said rate.

It is impossible to form an opinion respecting the part

of the Bremen trade which may be carried on by the merchants here on their own account; it may, however, be supposed that the same in general is about two-thirds or three-fourths of the whole amount, with the exception of the export trade from hence to the United States of America, of which about three-fourths are most probably for American account.

The opinion is, that the total value of the imports in 1854 has been about 56,000,000 rix-dollars, or 9,200,000*l.* sterling, and that of the exports in the same period 50,000,000 rix-dollars, or 8,200,000*l.* sterling, which is an increase of 1,200,000*l.* sterling in the imports, and of 800,000*l.* sterling in the exports, when compared with 1853.

The emigration *viâ* Bremen from the interior of Germany direct to the transatlantic States has been again this year, to a very great extent, and exceeds that of any one of the preceding years. The number is officially stated to have been as follows:—

To New York	15	steamers	with	3,619	persons.
To „	214	sailing vessels	„	42,367	„
To Baltimore	58	„	„	33,354	„
To New Orleans	43	„	„	12,935	„
To Galveston (Texas)	14	„	„	2,241	„
To Philadelphia	11	„	„	1,102	„
To Quebec	3	„	„	772	„
To Charleston (S. Carolina)	1	„	„	258	„
To Rio Grande do Sul	3	„	„	227	„

Together 362 vessels with 96,875 persons. In 1813, the number of emigrants was 48,511.

The passage money from hence to the United States varied this year from about 5*l.* to 8*l.* sterling, which includes everything from the day of embarking till the arrival at the port of destination, namely:—

a. Provisions, &c., conformably with the printed regulations.

b. Commutation and hospital money.

c. The insurance premium on the passage-money of the emigrants.

d. The same on 20 rix-dollars, or 3*l.* 5*s.* sterling for each, this sum being for the subsistence and to cover the expenses which might arise, should the vessel, by stress of weather or damage, be obliged to put into any port for repairs.

The regulations here in regard to emigrants require that, prior to the clearance being granted to the vessel, proofs of such insurance having been effected must be handed over to the Inspectors appointed for this purpose by the Senate.

The number of vessels belonging to Bremen and sailing under the Bremen flag at the close of the present year was 252, measuring 63,872 lasts, or about 100,800 tons, which is an increase of 11,000 to 13,000 tons when compared with 1853; 5 of these vessels, burthen about 2,600 tons, are engaged in the South Sea fishery; and 2 others, burthen about 500 tons, are generally employed in the Greenland fishery.

The Bremen vessels, being principally built for the transatlantic voyages, are for the greater part of large dimensions; the consequence of which is, that a number of Hanoverian and Oldenburg vessels are regularly employed in the Bremen trade with the European States, there being no doubt that they are fitted out and navigated at less expence than is practicable under the Bremen flag.

The Hanoverian and Oldenburg ship-owners residing on the river Weser have of late paid more attention to the larger-sized vessels, and have therefore at present several which are likewise suitable for the more distant voyages, the greater part of which are generally employed by charter in the Bremen trade. The 154 Oldenburg vessels from this river are computed to be about 17,250 lasts, or about 25,800 tons burthen; and the 22 under the Hanoverian flag, likewise from this river, at 2,950 lasts, or 4,400 tons. The total number, therefore, of sea-faring vessels from the river Weser is 428, with a tonnage of about 141,000 tons.

The population of the city and territory of Bremen continues undoubtedly on the increase, but to what extent it is impossible to ascertain with any degree of correctness; it is

supposed the number for the town, suburbs, and territory, may be estimated at 85,000 and upwards, but nothing official in this respect has been made public since 1842, at which time the population of all the territory was stated to be 72,820.

The railroad between Hanover and this city admits of a regular daily and prompt intercourse with Berlin, Saxony, &c.; the correspondence with London is thereby much improved, and regularly forwarded by the way of Aix-la-Chapelle and Ostend. A dividend on the above line has been paid again this year, with the prospect of an annual improvement, as the communication with the interior of Germany is thereby greatly facilitated. The desire is, that the line may be extended from hence to Bremerhaven, but the commencement thereof has hitherto not taken place, although it has been in frequent contemplation.

Two steamers, under the United States' flag, of the burthen of 1,641 and 1,734 tons, as also 2 under the Bremen flag, of about 1,200 and 1,800 tons, have been running this year between New York and this port; the United States' steamers made 10 voyages, but the Bremen only 4, on account of their having required some material repairs in the machinery. The orginal intention was, that the said steamers should continue their voyages in the winter months, but from some reason or other this plan has hitherto not been realized, notwithstanding the new dock at Bremerhaven was constructed for the purpose of admitting the arrival and departure of the said large steamers, even when the navigation of the river should be otherwise impeded by the ice. The rate of postage between the United States and this city with either of the said steamers, is 10 cents, or about $5\frac{1}{2}d.$ for a single letter of half an ounce; the number of letters forwarded therewith in the course of this year was 486,800 and 15,800 newspapers.

A steam tug of 120 horse-power has been built here, and is stationed at Bremerhaven, for the purpose of assisting the arrival and departure of vessels from this river.

An income tax of 1 per cent. was levied here again this year; but as, notwithstanding a material increase in the amount when compared with 1853, together with the regular local dues, it was not supposed to be adequate to the exigencies of the State, recourse was had to a property tax of one-eighth per cent.

31st *December*, 1854.

CHILI.

Abstract of Report from Mr. Vice-Consul Cunningham, on Coal Mines of Talcahuano, &c., in Chili.

Those in operation are situated at the ports of Lota and Coronel, both in the bay of Arauco: they have been worked for more than three years, and the ports in which they are situated are safe at all times for shipping.

The quantity of coal raised at Lota is about 300 tons per week. In a report from the French engineer of the Chilian war steamer Cazadon, it is stated that this quantity will be greatly increased as soon as proper machinery, at present in course of construction, shall be applied.

The quantity of screened coal raised at Coronel is about 1000 tons per week.

The selling price of the coal is about 5 dollars per ton at the pit's mouth, and 6 dollars if placed alongside vessel.

The Lota coal mines are worked under the designation of The Lota Coal Company. This company has contracted also, for a period of from two to three years, to receive nearly all the coal, the produce of the Coronel mines.

The coal has been used for some time, with great advantage, on board the Pacific Steam Navigation Company's steam ship Nueva Grenada, the master of which reports greatly in its favour, as does also the engineer of the Chilian war steamer Cazadon.

It produces a good deal of smoke, and requires some

management in this respect. Its heating qualities, however, are considerable; it is preferred on this account for the use of steamers to English and Welsh coals. It is stated by the engineer of the Cazadon to be less serviceable for the purpose of smelting, but it does not appear to have been tried to any extent, there being no means at hand for regularly testing its capacity in this respect.

Some question has however been raised, as to the effect produced on this coal by exposure to the air in hot climates, the impression being that it would not maintain its solidity under this condition: this question still remains unsettled.

It had been alleged that this coal, from the amount of sulphur it contained, would be peculiarly liable to spontaneous combustion; there does not, however, appear to be any foundation for this impression.

March 12, 1855.

CHINA (AMOY).

Extract from Mr. Vice-Consul Winchester's Report on Trade of Amoy, for the year 1854.

The year 1854 commenced before the port had recovered from the depression consequent upon the political troubles of the city and neighbourhood. For the first two or three months little occurred beyond inquiries for goods, and reduced shipments of cargo to the Straits, to supply the demand, which in that region was of course uninterrupted.

It was only when the communications of the interior with Canton were stopped by the spread of the insurgent power in that province, that trade was, as it were, forced into a revival at Amoy. Beyond all question, this is the true secret of the rather extensive arrivals and sales which are recorded in the circulars of the last six months.

Nor is Amoy the only place which has profited by the same cause. We must deem the very considerable imports which have found their way into the interior from Swatow

as equally the consequence of the demand seeking to be supplied through any channels that might remain open. When I visited Swatow on my way here, in the beginning of last month, I was assured, on good authority, that 10,000 bales of Indian cotton had been imported there, besides quantities of cotton yarn, and piece goods not inconsiderable.

The impression rests strongly on my mind, that the navigable and safe river on which Swatow stands, and the natural wealth and resources of the vicinity, which is the greatest sugar-producing district in China, prove it to be highly suitable for an entrepôt of foreign commerce, and render its inclusion as a legitimate port very desirable in any future treaty.

But while it must be admitted that the blockade of Canton has contributed in this important way to the revival of trade here, and that parts of the interior, accustomed to draw their supplies from the provincial capital, have obtained them from Amoy and Swatow, the amounts imported are small in comparison to those shown by the annual trade returns of Canton in ordinary years, and demonstrate how much the peaceful pursuits and commerce of the interior have been injured by the political troubles which prevail. It is only in the more essential articles of cotton and cotton-yarn, the manufacturing of which is in itself productive of value, and a means of support to the natives, that the necessity of a supply has been so urgent as to create any considerable demand through these substituted channels. With regard to the articles entirely manufactured, their deflexion from the usual route must be a work of more time, and its extent will be more or less dependent on the degree of quiet enjoyed by the several interior districts supplied.

These remarks serve to explain why our manufactures have shared to so small an extent in the revival of general trade. It may, however, be anticipated for the same reasons, that their consumption, through this port, will steadily increase, unless checked by the restoration of trade at Canton. The final result will probably be a permanent increase

of trade at Amoy, for when the districts, physically more contiguous, have once accustomed themselves to the course of trade in connection with this emporium, they will find in the less expense of carriage, a sufficient inducement not to resume their intercourse with Canton in all its former extent.

In connexion with the subject of imports, it may be proper not to omit to draw your Excellency's attention to the benefit which has accrued to the general balance of our trade with China, by the large amounts of silver which have been drawn from this, and the neighbouring districts of Chinchew and Swatow, as the price of goods and opium. High as have been the rates of exchange ruling during last year, they would have been still higher but for this supply. Our transactions, then, have been most important in helping to furnish at cheaper rates, the silver with which teas for England have been purchased, more especially at Foochow and Canton, and so to keep the price of that most necessary article within reasonable limits.

I now proceed to offer some considerations with reference to those staple articles of export commerce, which belong to the port.

Camphor.—There can be no question that a very considerable and advantageous export of camphor may be here carried on. The easy access, to and from Formosa, renders it the natural store-house of all the produce of that fertile island. The cause which has hitherto operated against the increase of transactions in this article, is the high rate of duty attached to it in the tariff. It is with difficulty that an article, whose market value is 11 dollars per pecul, can be made to pay 2 dollars duty, on the coast where the junks have so many facilities for smuggling, and illegal transhipment into lorchas and clippers. The arrangement made with the Hackwan, by Mr. Consul Parkes, to levy duty only on one-half of the whole quantities shipped, as allowance for evaporation, and the weight of water with which the camphor is sprinkled, to prevent evaporation, will have the effect of probably bringing supplies into the legal market, but not to any great extent, for it is credibly stated that the facilities

for the production of this article in Formosa are such, that it was sold at Fanshway to foreign lorchas in large quantities, at rates varying between 5 dollars and 6 dollars a pecul.

The article of tea, has, during the past year, attracted considerable attention from those connected with foreign commerce. There can be no doubt that Amoy is the natural port of shipment for considerable tea-growing districts. The recent excursion of Mr. Hyatt, the United States' Consul here, to the Pih-sha coal mines, which are situated on the Ning-yang districts, has satisfactorily proved the existence of a continued water communication to and from this port, with the interruption of a single land portage of eight miles.

The teas from these districts are low-priced, and have not, as yet, been specially prepared to suit the taste of the European market. As far as any ordinary person can judge of the physical and commercial qualities of an article, the discrimination of which, from its having been made a separate profession, has been surrounded with a special mystery, these teas, if so prepared, would be a most valuable addition, not to the stock of the expensive, but of the common herb, which forms the comfort of so many homesteads in England. I gather, that they have been neglected through ignorance, from statements made to me on undoubted authority, that the discrepant opinions of professed tea-tasters, with respect to shipments sent south, have been so singularly marked, as to be essentially ridiculous, and nothing else. There is therefore, reason to believe that a judicious trial of this market on a large scale is quite practicable, and will answer, if, from the continuance of trouble near Canton, or want of facilities at Foochow, or other causes, it should become the interest of the English merchant to make such a trial with earnestness and caution.

On the subject of Sugar, and Sugar-candy, the first remark which it occurs to make, is, that their market price has declined in a very sensible way, since my attention was first drawn to their export, seven or eight years since; at that time the ordinary market value of sugar-candy was 7 dollars per pecul. I can ascribe this to nothing but the increased

production, consequent on foreign demand. The same remarks are applicable to the former article, though in a less degree of course, as the essential worth is so much less: from this observation, the conclusion is deduced, that we may expect a gradual and steady increase in the export of these staples.

Sugar and Sugar-candy form no inconsiderable portion of the native goods which have been exported to other parts of the coast of China under the protection of foreign flags. The arrangement of Mr. Parkes, for the payment of native duties in such cases, is highly calculated to foster this trade. Besides the actual employment it affords to foreign shipping, in itself no inconsiderable object, our commerce reaches, and information is extended, to many places beyond the sphere of the five ports, and that too, without incurring the objection of the Chinese authorities. Its importance may be judged of, by the fact, that the lorcha trade may be considered as the safe support of the colony of Macao.

Already these vessels have opened a commerce with Formosa, which, we may be permitted to believe, in our hands would be of the most essential importance in bringing within our grasp, the coals, camphor, hemp, &c., &c., which are found there in such abundance. But the one essential condition of such a trade is, that, be the sea dangerous as it may to native craft, its navigation shall be reasonably safe from piracy to every coasting lorcha which sails beneath the English flag. To this end, the presence of the peculiar steam force recommended to the Home Government by Sir John Bowring, is an undoubted necessity.

The state of these waters cannot well be worse. The interior dangers, troubles, and consequent weakness of the Chinese Government, which have occasioned the increase of piracy, have for the same reason confined Her Majesty's vessels to the ports more than usual, or prevented the class of vessels most suitable to the service, from the nature of the coast and prevailing winds, from being disposable.

21*st February*, 1855.

CHINA (CANTON AND SHANGHAE).

REPORT of Mr. Consul ROBERTSON on the Trade of the Port of Canton, and Extract from the Report of Mr. Consul ALCOCK on the Trade of Shanghae for the year 1854.

THE diminution in some of the most important articles of export, apparent in the returns of this as compared with those of preceding years, is the best evidence that can be adduced of the state of disorganization affairs have fallen into at the port of Canton. It is unnecessary to enter into detail of the cause of this,—every day during the past twelve months has teemed with reports of the Imperialists and rebels—their respective successes and failures—the gradual, but steady approach of the latter to the vicinity of the city—their occupation of the country through which native produce must pass to reach Canton—their blockade of the highways, and seizure of the merchandise in transitu, until their attack upon and capture of Fuh-shan, a town, some twelve miles west of Canton, and where the principal manufactories of silk piece goods and other fabrics are situated, completed the measure of disasters which attended the Imperial cause, and at once closed the only avenue left open for trade of any kind.

After the fall of Fuh-shan, or Fat-shan as it is pronounced in the local dialect, the Imperial troops fell back upon the city of Canton, and the rebel bands followed them up to the walls, where, for two or three months constant skirmishes took place with various results, but it was evident from the first that the rebels had not the material, physical or otherwise, to reduce the place, or drive in the out-posts; and, as the cold weather set in towards November, they gradually retired and fell back on Fuh-shan, which they made their head quarters. On this point the Imperialists in turn advanced, and, after many reverses, it was abandoned by the rebel force at the close of the year.

But a more formidable movement was made on the eastern side of Canton during the autumn.

On a branch of the river, known as Blenheim Reach, in the vicinity of Whampoa, the anchorage for foreign vessels, and about twelve miles distant from Canton, a body of rebels, unconnected with the Fuh-shan or western division, made a descent, captured the Imperial fort situated thereon, and established themselves there under two leaders of the names of Chin-heen-leang and Ho-ah-luk. Gradually they usurped command of the navigation of the main river as far west as the Barrier forts, within five miles of the city, and east to those of the Bogue, commanding the entrance thereof from the sea—and every attempt of the Imperialists to dislodge them has hitherto been in vain, and in two naval engagements the loss of Imperial vessels and men was very heavy. So bold have they latterly become as to give notice to the chief foreign authorities of the blockade of Canton, and much trouble has resulted from their stopping and even capturing foreign vessels.

Of course the possession of the highways to a city, as rivers and canals are in China, cuts it off entirely from communication with the interior, and thus two bands of rebels, one on the eastern approach, composed chiefly of pirates from the sea-board; and another on the western, formed of the mass of unemployed and desperate individuals, of which China, like other countries, has her share, effectually barred all mercantile operations. Teas on their way down were seized, and although some few chops, released on the payment of "black mail," found their way to Canton, they arrived quite out of condition, from being so long in boats; while other portions appeared at Hongkong and Macao, and were impounded at the former place by the police, and returned to the owners. The result of all this was a total abandonment by the Chinese of all hopes of doing business this year, the closing of a great number of the hongs and shops, and, as matters looked more unfavourable for the imperialists, a general flight of the wealthy and better classes of Hongkong and Macao. So great at one time was the panic, that the foreign steamers could not convey the numbers that crowded

their decks at each trip, the shops of whole streets were closed, and the thoroughfares of this populous city all but empty.

Unfortunately, however, whilst local events were destroying the trade in exports, the turn affairs had taken could but little affect the importation of foreign produce, however much they did its sale. Merchandise from England, raw cotton from India, and Straits' produce, when ready and prepared for the market, must come on. No merchant would venture to go further than advise his constituents of the threatening aspect of affairs, leaving them to act on their own judgment in making shipments, so far at least as relates to a commission business; the consequence was that large stocks accumulated, and would have remained on hand to this day, had not an unexpected opening offered in another quarter.

The stoppage of teas on their way to Canton soon became known in the tea-producing districts, and created considerable alarm among the farmers, collectors, and also the Chinese authorities, whose means of making up the stipulated amount of foreign duties for the Emperor's treasury (foreign duties not being carried to the Imperial Government account), threatened to fail altogether.

Hitherto the Imperial authorities seemed to have set their faces against trade at Foochow. No foreigner who tried the market had succeeded in overcoming the difficulties which opposed him; but now, with the threatened defalcation in the duties, and the distresses, and, consequently, the dissatisfaction in the tea-growing districts, which were to be avoided, if possible, in the present disorganized state of the empire, pressing upon him, it appears as if the Governor-General of Fokien turned his attention to Foochow, as offering, from its geographical position, the opening for exports which local disturbances had closed at Canton. The undersigned is in possession of such information on this point as leaves no doubt on his own mind that the local authorities at Foochow were themselves the originators of

the large trade which has sprung up at that port during the past year.

Foochow, however, did not relieve the Canton market of the plethora of imports it laboured under; a few were sent round there, but no great demand evidently existed,—the hopes of our merchants, that a large import would naturally attend a large export trade were soon dissipated. They forgot, or did not see, that teas being light produce are easy for transport through the hill passes, and down the rapid shallow streams of the mountain province of Fokien, the dip of the land being towards the sea, and consequently "down hill," all the way, and that this, which was an advantage in the case of light native produce was a disadvantage in that of foreign merchandise, which being heavy and unmanageable, and by no means valuable in proportion to its weight, would never pay for land carriage in such a country, to say nothing of the population being poor and thinly scattered, and consequently offering less capabilities for consumption. The discovery of these obstacles, and the probability of no remedy for them being found, had a material influence on Canton; and the providing specie for the Foochow market, for payment of teas became an important branch of commerce, and the business of Canton may be said, for the present, to have settled into a banking one.

The Amoy market, however, in the early part of the year, showed symptoms of improvement; the stocks of raw cotton and goods on hand went off at fair prices, and a demand springing up for more was speedily responded to, and considerable shipments of merchandise and cotton were made for that port from Canton. It is difficult to ascertain the actual quantities exported for that market; there are so many vessels under foreign flags passing to and fro between Canton and Hongkong, the cargoes of which it is impossible to get at, that nothing but an approximation can be reached. It is known that in British vessels raw cotton to the amount of 85,868 peculs, manufactured goods to the amount of 50,272 pieces, and of woollens 77,351 changs, on which

import duties had been paid, were re-exported; but as the probability is there was more on which duties had never been levied, and were sent out as they came in without passing through the custom-house, the Amoy returns of trade will alone show the total imports from Canton.

In the colony of Hongkong, also, Canton found a market for its unsaleable merchandise. Considerable quantities of piece goods and woollens have gone off there at fair prices; and what may be termed a brisk demand for British fabrics has sprung up most unexpectedly. This, of course, is the result of the blockade of Canton, which prevented Chinese traders from sending goods from Canton to the cities on the sea-board, and compelled them to purchase at Hongkong and ship them there.

In taking this brief view of the position of the Canton market, it may be observed generally that, had the rebels been in possession of the city, and the Imperialists of the country, no interruption of material consequence could have occurred to foreign trade; but the case is reversed—the Imperialists are blockaded in the city, and the rebels have command of the approaches thereto, and are in possession of the neighbouring country. This obstacle might have been overcome had the insurgent movement been a patriotic or combined one. At first it was supposed so to be; and, in that belief, several of the Chinese tea-brokers entered into negotiations for the release of their teas, and paid "black mail" on them, as before mentioned, and received a pass to free them to Canton. They had proceeded, however, but a few miles when the same teas were impounded by another section of the rebels, who repudiated any connexion with the first party. Thus it was found impossible to open the road. Moreover, the local authorities forbid by proclamation the payment of black mail.

A state of things, such as above detailed, naturally had its influence on all branches of commerce,—the falling off in shipping was one result. The following table will show the differences between this and the past year more clearly than any explanation could:—

INWARDS.

Year.	British.		American.		Foreign.		Total.	
	No. of Ships.	Tonnage.	No. of Ships.	Tonnage.	No. of Ships.	Tonnage.	No. of Ships.	Tonnage.
1853	172	85,361	71	47,827	85	27,247	328	160,435
1854	137	68,795	65	45,690	118	39,672	320	154,157
Diff.....	35	16,566	6	2,137	33	12,425	8	6,278

From which it will be seen that, compared with last year, there is a falling off of thirty-five in British vessels entered inwards; and in American six, with an increase in the number of vessels under other flags of thirty-three. This is attributable to the large importations of rice made in German and Danish vessels.

OUTWARDS.

Year.	British.		American.		Foreign.		Total.	
	No. of Ships.	Tonnage.	No. of Ships.	Tonnage.	No. of Ships.	Tonnage.	No. of Ships.	Tonnage.
1853	181	89,433	75	51,648	86	26,191	342	167,272
1854	136	69,050	60	43,137	110	37,584	306	149,771
Diff.....	45	20,383	15	8,511	24	11,393	36	17,501

And a falling off of forty-five in British vessels entered outwards, and in American fifteen; but an increase in vessels under foreign flags of twenty-four; showing, however, on both a total diminution on last year's entries of forty-four vessels, representing 23,779 tons.

Of these 137 vessels entered inwards, 11 of them were direct from England, against 28; 44 from India, against 52; and from Singapore 19, against 28 of last year; all with cargoes. The entries outwards of 136 vessels show—to England 38, against 58; to India 19, against 20; and Singapore 1, against 17 of last year; all with cargoes; showing on vessels *inwards*, with cargoes, a falling off this year on last of 34, and *outwards* of 37; total 71.

The indirect or carrying trade, as far as relates to foreign countries, shows no great discrepancies compared with that of the last year; but as between the ports in China, of fourteen vessels. This may be accounted for by the re-shipments made at this port for Amoy and other places. It is to be observed, however, that large quantities of goods have gone out in lorchas and other vessels under foreign flags, of which no account can be obtained.

The following table will show the rates of freights per ton to the within mentioned places during the year:—

1854.	Great Britain.		New York.		San Francisco.	
Month.	Tea.	Silk.	Tea.	Silk.	Tea.	Silk.
	£	£	$	$	$	$
January .	5 @ 5 10	....	18 @ 20	30 @ 35	20	30
February .	6	....	....	....	27	....
March .	7	....	20 @ 22	 35	25	....
April .	7 10	....	20	....	....	....
May .	6 10	....	18 @ 35	20	....	....
June .	....	....	16	35	20	....
July .	6 10 @ 8 10	....	18	„ „	„	....
August .	5 5	....	„	„ „	15	25 @ 30
September	4 10 @ 5 0	....	„	30	14 @ 15	„
October .	4 10 @ 5 10	....	16 @ 18	30 @ 35	15	....
November	„	....	„ „	„ „	15 @ 2	....
December	„	....	Nil.	Nil.	10 @ 20	....
Average, £6 10 per ton.			18 50 — $30 £4 8 — £7		$18 50 — $28 £4 8 — £6 13	

The decrease in the importation of woollens is this year, compared with that of last, very large, there appearing but in value 8,750 dollars against 99,989 dollars of 1853; and of this small quantity, the greater portion, with that of old stocks on hand, was sent to Hongkong to realize what it could.

The great falling off in the importation of manufactures of cotton this year, viz., 132,838 pieces, affords additional proof of the disastrous effects the rebellion in the Canton Province has had upon British trade. Chintzes and other kinds of cotton manufactures show an equal reduction.

In cotton yarns, also, there is a defalcation in the year's delivery of 8,483 peculs, representing in value 212,075 dollars.

In raw cotton the diminution is some 38,092 peculs, representing in value 317,306 dollars, which, in proportion to the falling off, is not so much as might have been anticipated. Little, however, of it found a market; and, notwithstanding the large exports to Amoy, large stocks remain on hand.

In the importation of Straits' produce a considerable falling off appears. The value of actual products of the Straits imported this year does not average more than 100,000 dollars, the vessels usually employed in this trade having loaded with rice, and the prospects of the Canton market having deterred merchants from entering largely into Straits' operations.

The decrease in the export of tea, viz., 5,075 peculs, is not so great as might have been expected. The fact is, that, at the close of the year 1853, large stocks remained on hand of that season, and portions of the new crop continued to arrive until about the month of July, when the disturbances in the province began to be felt, and threatened to cut off all further supplies; and thus the briskest period of the year in the Canton market became this year the dull one; and by August the stoppage was complete. After this date hopes were entertained, but never realized, of inducing the rebels to let the teas pass on pay-

ment of "black mail;" this, as before observed, was found impossible, and the market was closed. The rebels, however, finding they could make nothing of their seizures, took the teas to Macao and other places, where they were offered for sale, and considerable quantities purchased. Prices averaged much the same as last year, although there were considerable doubts as to the soundness of the teas sent home last year, which were confirmed by accounts of the damaged state of some of the newly received chops.

On the 4th of October last, a meeting of foreign merchants was convened at Canton to consider the question of damage, and on whom the losses incurred in consequence ought of right to fall. It appeared to be the opinion of the meeting that, owing to the disturbed state of the country, which interfered with the proper manipulation of the teas, and their being subjected to exposure in being carried from place to place in bags and baskets, in a half-dried state, the final firing was not sufficient to prevent a relapse when stowed in the warm hold of a ship.

Respecting upon whom the loss was to fall, unless it were possible to enforce claims against the curers of the teas, it must, except in proven cases of negligence, in Canton, be borne by those concerned in the shipments; and, as for remedy against the recurrence of such losses for the future, it was proposed, hereafter, to obtain guarantees from the sellers if possible. These resolutions were passed, and have been acted upon. It may be remarked that the returns of teas for the year 1853 were made up from the custom-house entries, which are always considerably under the actual shipments. Those of this year are compiled from private and reliable sources, and may be said to be fairly correct; but they make the deficiency this year appear less than it really otherwise would be had both returns been made on the same basis.

In the product of silk there appears an increase on the returns of last year of 210 peculs. This may be accounted for from the anxiety of holders to realize what they could,

and prices were consequently easy. Moreover, there was considerable stagnation in the manufacturing trade, which threw more of the same produce on the market than at former seasons. Of Nankin silk, very little came down.

The close of the market for the sale of imports, and the consequent accumulation of stocks at a time when there was imminent risk to them from the threatened capture of the city by the rebel force which blockaded it, rendered it expedient that the goods should, if possible, be removed. To facilitate this, the undersigned arranged with the Chinese authorities that merchandise, on which import duties had been paid, might be sent to the other ports in China and to Hongkong, to be re-imported into Canton hereafter, if required, free of a second levy, provided the packages and the custom-house seal were unbroken. This concession on the part of the custom-house authorities was very opportune. Hitherto they would issue a certificate of duty having been paid on merchandise sent to the other ports, with the exception of Hongkong, which they always considered a foreign port, which would exempt it from a second levy; but re-importations were not admitted; but, under this arrangement, an opportunity was afforded for trying other markets, or conveying goods to Hongkong for safety, and re-entering them free when the times became quiet. This, together with the improvement in the Amoy market, and the springing up of a trade at Hongkong, caused the exportation of considerable quantities, as the following table will show:—

Denomination of Articles.		1853.	1854.	Increase.
Woollen Manufactures	Changs	6,792	77,351	70,559
Cotton Ditto . .	Pieces	23,461	50,272	26,811
Straits' Produce. .	Piculs	7,615	13,237	5,622
Cotton, Raw . .	Ditto	9,168	85,868	76,700

Larger quantities than these were, however, exported, but the amount it is impossible to obtain.

The following table may be useful, as showing the differences between the quantities of goods exported in the year 1854, compared with 1853:—

ARTICLES.		1853.	1854.
Aniseed, Star	Pic.	287	1,387
Ditto Oil	„	31	12
China Root	„	100	77
Silk, Raw	„	277	487
Ditto, Refuse	„	1,835	1,326
Sugar Candy	„	268	23,734
Tea	„	183,827	178,752
Tobacco	„	845	1,861
Walking Canes	No.	341,900	420,000
Boots and Shoes	Pic.	46	66
Brass Leaf....	„	891	857
China Ware	„	2,840	1,000
Fireworks	„	2,388	1,777
Kittysols	Pieces	111,050	728
Mats and Matting	Pic.	6,530	11,657
Rattan Work	„	550	806
Silk Piece Goods	„	518	320
Vermilion	„	64	190

As in all foreign markets, the exchanges in Canton form a very important item, and the following table will show the fluctuations during the past year.

1854	On England.		On India.	
	First Class Paper and American Credits.	Bills on London 6 Months' sight.	Company's Paper per $100.	Bank Paper, 3 to 30 days' sight, per $100.
	s. *d.* *s.* *d.*	*s.* *d.* *s.* *d.*	Rs.	Rs.
January .	5 1 @ 5 2	5 1	242	242
February .	4 10½ „ 4 10	4 9 @ 4 10	230	230
March .	5 1 „ 5 1½	5 0 „ 5 0½	242 @ 244	242
April .	5 2 „ 5 3	5 2 „ 5 2½	248 „ 250	250
May .	5 2½ „ 5 1	5 0	248 „ 240	240
June .	5 0½	5 0	239 „ 240½	240
July .	5 0½ „ 5 0¼	5 0 „ 5 0¼	241 „ 242	240 @ 241
August .	4 9½ „ 4 8	4 8	239 „ 232	232 „ 233
September .	4 9½ „ 4 10	4 9	240 „ 241	238 „ 240
October .	4 9 „ 4 8¾	4 8½	243 „ 242	239 „ 242
November .	4 7¾ „ 4 7¼	4 7¼	235 „ 236	235 „ 236
December .	4 9 „ 4 8½	....	Nil.	240 „ 243

It will be observed, that the exchanges on England never ruled higher than 5*s.* 2½*d.*, whilst in the months of July, August, and September, the business season of the year, 5*s.* 0½*d.* and 4*s.* 9½*d.* appear against 5*s.* 8*d.*, and 6*s.* 6*d.* of the same period in 1853. This may have resulted from the depressed state of trade, the large imports of bullion, and the alteration in the currency of the port, which will be adverted to hereafter.

There is, however, another exchange, which claims attention from the fact of its being the point on which the foreign one turns, its rise and fall influencing in a great measure operations in the latter. This is the bullion market of China, represented by gold in bar and leaf, sycee silver, and dollars of various denominations. The following table will show the fluctuations in this currency medium during the year 1854.

1854.	Sycee Silver. 100 Touch or Pure.	Gold. Price per Tael.	Gold Leaf. Price per Tael.	Dollars. Premium of Spanish over Mexican.
		$	$	$
January	1·2 p. cent. dis	20 70	....	....
February	3 7 „ prem.	21 70	....	15 50 prem.
March	3 2 „ „	21 30	....	18 50 „
April	2 5 „ „	21	....	17 50 „
May	3 2 „ „	21 20	....	19 — „
June	3 8 „ „	....	21 30	21 50 „
July	3 2 „ „	....	23 50	21 50 „
August	No quotation.	....	....	....
September	No quotation.	....	....	....
October	3 1 p. c. prem.	....	21 15	23@24 „
November	6 5 „ „	....	21 55	27 .... „
December	9 5 „ „	....	21 80	27 50 „

Hence it may be observed, that the currency medium in China is in a most fictitious state, from the want of a standard "measure" of value, for the measure in use is a foreign coinage, in itself a marketable commodity, and at a premium or discount, in relation to its various mintages and the Chinese Government standard of pure silver, which in itself is also subject to fluctuations as demand or supply influence

it, or the true standard of value, *rice*, the staff of life of the Chinese, is plentiful or scarce.

To illustrate the loss this fictitious state entails on British merchants, let us take the payment of tonnage dues on a vessel, and the following account of the transaction will show the operation of the money market.

	Taels	m.	c.	c.
Vessel of 336 tons at 5 mace per ton	168	0	0	0
Difference allowed for turn of scales, melting expenses, &c.	2	5	2	0
	T. 170	5	2	0
Sycee bought at 10 taels 9 mace premium	T. 18	5	9	0
	T. 189	1	1	0

So that the actual government dues of 168 taels on a ship of 336 tons, must be paid at a cost of 21*t*. 1*m*. 1*c*. to the merchant.

Nor does the transaction always end here. It may happen that, sycee being scarce, it would be more advantageous to pay these dues in dollars, and this can be done at a fixed rate (in the Canton custom-house,) of 71*t*. 7*m*. per $100, which on 189*t*. 1*m*. 1*c*. amounts to the sum of $263·75, and the question then arises in what coinage it is to be paid? for there are dollars of various denominations and values, in relation to their purity and currency. In Shanghae the clean, unchopped Spanish Carolus dollar, at a premium of from 27 to 30 per cent. over South American dollars, are alone current; so, until lately, at Canton were the chopped and broken Spanish dollars, at a premium of from 6 to 10 per cent. over South Americans, solely in use; and (speaking of the latter port), in this medium alone would the custom-house shroffs or bankers receive duties when paid in dollars. If, therefore, the premium on sycee silver was higher than on chopped, broken, or whole Spanish dollars, the merchant paid his duties in the latter at the fixed rate above mentioned.

The undersigned, on taking charge of Her Majesty's Consulate at Canton, in the year 1853, having conferred with the foreign merchants generally on the question, and engaged their support in carrying out his views, so far as related to mercantile transactions, made an attempt to equalize the currency, in which he was successful, and the *modus operandi* may be briefly stated.

It has been mentioned above, that the chopped and broken Carolus dollars were the only dollars the shroffs would take for duties, and these were always at a premium of from six to ten per cent. over other dollars, with a probability of being higher, as their issue from the Spanish mint has long ceased, and the Canton custom of stamping, clipping, and melting them is fast destroying the few that are left.

By a government assay held in Canton on the 13th of July, 1843, by British and Chinese commissioners, to determine the relative values of the various denominations of dollars to the standard of pure silver, and their relative values to each other by the same test, it was found that the intrinsic silver value of the Mexican and South American dollar was one per cent. more than the Spanish or broken dollar; for instance, one tael weight of Spanish or broken dollar required 1*m*. 1*c*. 6*c*. 6*c*. 6*h*. to render it equal to a tael of pure standard silver, whilst, in South American dollars, the sum to be added to bring a tael weight to standard in no case exceeded one mace and a few cash, thus showing that the intrinsic value of the latter exceeded that of the former by nearly a candareen per tael (one per cent.). In demanding, therefore, the payment of duties in the Spanish or broken dollar, the government shroffs were guilty of a fraud, for they could not legally refuse the South American dollar when tendered at the custom-house rate of 71*t*. 70*m*. per $100, and there is little doubt they paid the duties into the provincial treasury in that coin, or in sycee at favourable times, and pocketed the premium on the Spanish or broken dollars. The undersigned deeming the first step to be taken was with reference to the custom-house "squeeze," pointed

out these facts to the Imperial Commissioner Yeh, and claimed the right of British merchants to pay in what dollars they pleased, in accordance with the terms of the assay of 1843, mentioning at the same time the embarrassments resulting, and likely to increase, from the restricted medium in use, and calling upon his Excellency to issue proclamations, declaring the intrinsic values of the different denominations of dollars, and that hereafter all must be taken at par with each other. This, after some negotiation, the Imperial Commissioner did; the shroffs resisted it for a time, but ultimately yielded, and in a very short period the scheme was in complete operation, and brought down with it the premium on sycee. The effect was immediate on mercantile operations, and at this day all dollars are taken at par, to the great convenience, and indeed advantage, of the foreign merchants.

Much, however, remains to be done, and as long as an Imperial standard measure of value, in the form of a silver or gold coinage is wanting, fluctuations in the price of bullion and foreign coins will exist, and more or less affect mercantile operations.

The imports of opium this year are much in excess of those of 1853 to the amount of 17,775 chests. This increase is shown in Patna opium, 25,519 chests against 13,321 of the preceding year. The total may be taken at 42,453 chests, in value $15,995,479, at the following quotations:—

Patna	at 346	Dollars per chest.
Benares	at 350	„
Malwa	at 455	„
Turkey	at 450	„

Almost the whole of this large delivery at the opium station of Cum-sing-moon was sold, or dispatched up and down the coast, leaving only of sorts 1,521 chests in stock at the end of the year.

The following table will show at a glance the value of the legal trade for the past year, compared with that of 1853.

	$	£	
1854	3,348,444	795,255	Imports.
	6,098,477	1,448,388	Exports.
	9,446,921	2,243,643	At 4*s.* 9*d.* per $.
1853	4,058,233	1,065,286	Imports.
	6,531,989	1,714,647	Exports.
	10,590,222	2,779,933 at 5*s.* 3*d.* per $.	

Showing a balance against the latter in dollars $1,143,301, and in sterling (at two rates) 536,290*l.*

The difficulty of obtaining information from the custom-house, for the purpose of making up the returns, has prevented the undersigned from giving so much time to the preparation of this Report as he desired.

British Consulate, Shanghae,
March 29, 1855.

I HAVE the honour to inclose, in duplicate, the Returns of British Trade at this port, during the year ended December 31, 1854; but owing to the confusion prevailing at the port during the continuance of hostile operations against the city, and the absence of a custom-house, I have found it impossible to obtain any reliable returns of the collective foreign trade; and have not, therefore, attempted to prepare a synoptical table of trade under all flags.

It must be subject of congratulation that, with the city in possession of a band of triad insurgents, recognizing no obligations, and bound by no treaties, and the surrounding country covered by large bodies of ill-disciplined Imperial levies, some 20,000 being in position outside the walls during the whole year, and engaged in active hostilities of a savage and relentless character, it has been found possible to preserve a foreign settlement open on every side, with some two millions'

worth of property stored in the warehouses, and at the same time carry on an export trade of nearly four millions sterling, to which a British revenue of half that amount was attached. These are results which cannot fail to be satisfactory to Her Majesty's Government, and I venture to hope may be regarded as no inadequate compensation for the difficulties in every direction encountered, as well as the many serious complications arising from time to time connected with the questions of neutrality, Chinese revenue, and the relations of the British Government with the country under treaty; difficulties attaching unavoidably to so exceptional and critical a state of affairs, when prolonged through a period of eighteen months. To protect British life, property, trade, and revenue, to so large an amount, under such circumstances, was a task of no ordinary difficulty or responsibility; and rendered still more onerous by the necessity of reconciling these objects with the exigencies of a neutral position between the belligerents, and a fair recognition of obligations imposed upon us by treaty with the established—but locally paralysed—government of the country. I am glad, in resigning my charge, to be able to report that not only were these great objects constantly kept in view, and in all essentials secured; but now that the civil war has been brought to a satisfactory close, as far as this port and immediate district is concerned, by the destruction of the bands who seized upon the city, our position in regard to the authorities and the people is even more secure and more satisfactory under many aspects, than it was prior to the commencement of the disturbances, notwithstanding these have seemed so often in danger of serious and permanent deterioration.

The import trade has been all but suspended, the unsettled state of the country preventing any large demand. Since the recapture of the city, however, inquiry for our manufactured staples has been active, and already considerable sales, at improved prices, hold out promise of a speedy restoration of this branch of commerce.

CHINA (FOO-CHOW-FOO).

Report of Mr. Vice-Consul Hale on the Trade at Foo-chow-foo, for the year 1854.

In offering some remarks on the trade at this port, during the past year, and its future prospects, it is with the greatest satisfaction I have to observe, that it is generally expected by the mercantile community and by those well able by their position to form a correct judgment, that the port of Foo-chow-foo will become the seat of a very large portion of the tea trade, and that a market for imports will probably be developed.

Import Trade.

As to the present extent of it, it is difficult to form any conclusion which can be relied on, as every one here engaged in the trade appears interested in disguising the fact of any sale of goods being practicable. The Consular Returns, however, will afford some data, not that these are to be trusted as strictly in accordance with the actual state of affairs.

I have taken some pains to obtain a correct estimate of sales of imports, and I believe that I am not far wrong in stating that for the past year they cannot be valued at less than 200,000 dollars, exclusive of opium. This amount is not very large, but it is a hopeful commencement, and goes to justify the opinion that a greater development will be manifested during the next year's trade. I would beg to remark that the greatest drawback to the immediate extension and wide spreading prosperity of the port is owing to the universal feeling amongst foreigners of the insecurity of property, lest it might be destroyed in some of the fires so frightfully common here; and I feel bound to add, that if any value be attached to the trade growing up at this port, it will never again be left without the protection of one of Her

Majesty's ships of war; and when ground has been obtained for building purposes, property will then be stored in securely built premises, and will be as safe as anywhere else in China.

Opium Trade.

The extent of it is truly astounding, and I have reason to believe that sales must be going on at the rate of about 5000 chests per annum. It may be that the extension here has diminished the business at Amoy and other stations, but I hardly think this can be so, as they were lately reported bare of stock. The trade here is conducted in the most open manner, the drug being always brought up by daylight, stored in the merchants' hongs, and delivered as publicly as any other commodity. Monthly fees are paid to several officers of the Chinese Government; and I am assured by a resident merchant here, that on his first arrival he landed a good deal of opium before he was asked for any payment, or even knew of its being customary; it is therefore surmised that no interference would take place if the fee was withheld.

Prices, both of opium and manufactured goods, have generally been in advance of those obtainable at other places.

Export Trade.

Tea.—The total shipments of the year, partly from actual information, and partly from estimate, will be about 17,000,000 lbs. valued with duty, but with no other charges, at 2,500,000 dollars.

	lbs.
The exports to Great Britain have amounted to .	12,400,000
Holland (probably)	800,000
United States	3,300,000
New South Wales	500,000
	17,000,000

and they have been carried in about the following proportions—

	lbs.
By British vessels . . .	11,000,000
By American	5,400,000
Other foreign flags . . .	600,000
	17,000,000

Two British, one American, and one Hamburgh vessel, are now in port, and it is estimated that the unsold stock of tea at market to be about 3,000,000 lbs. There are portions of several cargoes ready for shipment; how much more may be brought down it is impossible to say; but it is thought likely that the export of the season will not be less than 25,000,000 lbs.

The prices paid for tea have been much below Canton rates of this year, or those generally current; and taking the high exchange into account, I think about 10 per cent. below those which have ruled at Shanghae during the same period.

Silk is not produced in any quantity in the neighbourhood.

Hemp, or rather the grass-cloth material, and the fibre of a kind of palm, used largely here in the manufacture of rope, have also been exported; but these articles are of such small value as hardly to call for special notice, particularly as the grass-cloth material has disappointed expectation when shipped from other ports in China; and the palm-fibre has been frequently tried, I am informed, from India and the Straits, without success.

Sugar and Sugar-candy are made here of good quality, but the price is high, and the natives draw the bulk of their supplies from Amoy and its neighbourhood.

The export trade of Foo-chow, then, may be considered at present as confined to Tea.

Future Prospects of the Port.

It is the general opinion that it has not nearly attained the magnitude to which it will hereafter reach; the total

export of tea has been already stated at 17,000,000 lbs., and no doubt some millions more will be shipped before the close of the season. As until last year no business was done here, this may be considered as only the *second* season of Foo-chow; while it was not until the *sixth* season after the opening of the port that the trade of Shanghae in tea reached the total that of Foo-chow will probably amount to during this its second season.* That this rapid growth of the trade is to be attributed to the troubles at Shanghae and Canton is doubtless, but it is not an unnatural diversion of tea from the parts whence it can be most advantageously shipped to a less eligible but more quiet one. Foreign capital, in consequence of the troubles elsewhere, has at length been directed to a place too long neglected, in the heart of, or closely adjoining to, large producing districts, the supplies from which are now finding their proper outlet; neither has Foo-chow, as might naturally be supposed, drawn so far its supply, to any material extent, from teas intended for Canton and Shanghae. It is known that a very considerable quantity of tea is now detained on the way to Canton, by the troubles in its neighbourhood; and I am told that some time since messengers were despatched from hence to secure some of this tea, but wholly without success, the Chinese officers forbidding its return, from apprehension, I suppose, of the alarm such a movement would occasion, or the weakness it would be a confession of. A hope is still entertained that some of this tea will eventually make its way hither. It may also be useful to observe, that in the year 1853 (last season) the bulk of the tea shipped from this port was made expressly by the agents of foreigners with

* *Shanghae Exports.*

	lbs.
1844–1845	3,800,000
1845–1846	12,459,000
1846–1847	12,494,000
1847–1848	15,711,000
1848–1849	18,303,000
1849–1850	22,363,000

money sent up for the purpose; whereas during this season, though foreigners have been the manufacturers to a great extent, a very full supply has been brought down by the Chinese for sale in the open market: the latter would appear the sounder and more healthy state of things.

Navigation of the River.

The highly useful measure ordered to be undertaken through the representation of his Excellency Sir John Bowring, for the survey of the River Min, cannot fail to be of the utmost importance to the shipping interests, and it is greatly to be hoped that the suggestions of the officer who has conducted it will be carried into effect. This being done, I am warranted by the opinions of all the masters of vessels spoken to on the subject, in saying that the port of Foo-chow will present no extraordinary difficulties; and even as it is, that the approach to it is safer than that to Shanghae; while from the great rise and fall of the tide, the character of the river banks, and the extreme cheapness of timber, docks for building and repairing ships might certainly be profitably constructed here, and perhaps ere long an important trade of this nature may spring up.

Steam Navigation.

Any difficulty at present experienced by large vessels in arriving or leaving the port will be removed altogether by the employment of a steam-tug, and doubtless there will be one here before long. Here again the cheapness of wood for fuel purposes will be a great advantage, and will render visits of steamers less expensive than to other places.

Postal Arrangements.

Great inconvenience is felt from the want of safe and regular means of communicating with Hong Kong and Shanghae. Could the Peninsular and Oriental Company's steamers call here periodically, this would of course cease;

but until they do, it is worthy of suggestion that an attempt be made to connect the five ports open to trade by a line of Chinese couriers leaving at regular intervals. The merchants at the different ports would no doubt readily contribute the necessary funds by monthly subscriptions. The times are certainly not very opportune for such an arrangement, but it is useless to wait for quietness in China.

In conclusion, I would observe that, from all inquiries made on the subject, it is expected very confidently that the large export of tea going forward from this port, and the trade in imports will continue, and increase without any real injury to the ports of Shanghae and Canton; for our imports are creating their own market, and it cannot be advantageous that money should be expended on the conveyance of tea to distant places which can be shipped from others nearer at hand; while, moreover, the competition of a third port, affording purchasers a greater choice of markets, must tend to keep down prices at the other two.

Finally, I close my Report by appending a summary statement of the estimated values both of the imports and exports, together with the probable amount of treasure brought into port during the year 1854, and which I have every reason to believe will be found a near approximation of the capital invested.

	Dollars.	Dollars.
Imports—Manufactured goods . .	200,000	
Opium	2,100,000	
		2,300,000
	Dollars.	
Treasure . .	2,500,000	
Exports—Tea		2,500,000

31*st December*, 1854.

CHINA (NINGPO).

Extract from the Report of Mr. Interpreter Meadows, on the Trade of Ningpo during the year 1854.

The imports into Ningpo, as derived from the manifests, amount to 225,817 Spanish dollars, the exports amounting to 159,909 Spanish dollars.

Native Ningpo boats, belonging to Chinese merchants, import most of the foreign manufactures into this port. The British manufactures imported into Ningpo are re-exports from the port of Shanghae. During the year 1854, no vessel imported British goods direct from Great Britain. During the last eight months of 1854, British vessels have done a considerable deal of the coasting trade to and from the province of Fuhkeen.

Eleven vessels, having a total burden of 1,551 tons, most of them belonging to Amoy, entered in and cleared from this port during the last half year.

These vessels do not include the luggers which belong to this port, and which have greatly increased in number within the last eight months, and which are employed in the coasting and convoy trade down to Amoy to the south, and up to Shanghae to the north.

The number of luggers carrying on the convoying and coasting trade, and belonging to British subjects established at Ningpo, is twenty, of the tonnage of 1,117 tons.

I am happy to state that the whole of the convoying trade is now in the hands of British subjects; and I think there is every prospect of the coasting trade greatly increasing in their favour. One great drawback to it at present, however, is the want at this port of steady Englishmen, of the class of mates in British merchantmen, to act as masters of the convoying and trading British luggers and schooners. I hope, however, that it will soon become known at Hong-

kong and Shanghae to men of that class, that their services are in great demand, and that they will begin to come to this port, where they are certain immediately to get employment at better rates of wages than in merchant vessels trading from England to China.

27th January, 1855.

CHINA (SWATOW).

Report of Mr. Consul Robertson, on the Trade of Swatow.

Sir,—On my passage from Canton to this port during the past month, the vessel I was on board of touched at the island of Namoa, or rather, running under it, brought up at the anchorage in the bay called Swatow.

Being struck with the appearance of the place, the position of the harbour, almost entirely landlocked, and protected from all winds, the number of merchant-junks at anchor, and the apparently rich cultivation of the soil, I made it my business to make some inquiries, deeming that acquaintance with the capabilities of this part of the coast, as a place for trade, might be found useful. Accordingly, after investigating the matter as far as my brief visit of a few hours would allow, I left in the hands of a gentleman there a few queries for correction and confirmation, impressing on him the necessity of obtaining the most reliable information thereon. In due course he forwarded the replies, and I have now the honour to inclose, for your Excellency's information, a précis, in the form of a Memorandum, of the result of my observations and inquiries.

Inclosure in separate Despatch of November 28th, 1853.

Memorandum on the Annual Trade of the Port of Swatow, in China.

Description of Goods.		Quantities.	Value.
Exports.			
			Dollars.
Sugar, to Shanghae and Straits	taels	400,000	1,600,000
Tea, to Singapore	boxes	20,000	65,000
Paper, crockery ware, &c., ditto		..	10,000
Imports.			
Raw cotton from Shanghae, Canton, and Singapore	bales	30,000	600,000
Cotton yarn from ditto	taels	1,000	24,000
Rattans from the Straits		4,000	9,000
Rice from Straits, Cochin China, and Siam		25,000	450,000
Oil-cake from Shanghae, &c.		80,000	800,000
Treasure, in Mexican dollars		..	100,000
			3,658,000

The above return is exclusive of the trade in dry salted fish, which is very large; camphor, woods, &c., which are exported; and the various articles too numerous to mention, called "Straits' Produce," which are imported, all in Chinese bottoms, and on native account.

Remarks.

The seaport locally called Swatow, in the Mandarin dialect Shantow, is situated in the jurisdiction of Ching-hae-hien, which is again subordinate to Chasoochowfoo. The magistrate at Swatow is of the sixth rank, and is called a Tungpan, or Sanfoo, literally "third Foo;" the first Foo being a Chefoo, next in rank to a Taoutae; the Hacpangting being the second Foo. It is the port for many towns in the neighbourhood; for instance, Kieh, Tanghien, Tapoohain, and a

large town, distant about twelve hours' journey, called Changlin, whence formerly there was a considerable trade with Amoy and Canton, it being on the route to Canton, and about equidistant from both places. This traffic is greatly reduced since the direct foreign trade to Amoy has been established, but has revived considerably of late; the anticipated troubles at Canton, and the occupation by the rebels of Amoy, having thrown the junk trade in Swatow, where the goods are landed, conveyed by water-carriage to Changlin, and so on to Canton.

Besides the magistrate before mentioned as resident at Swatow, there is a military subaltern in charge of the police. The superior jurisdiction over all these places is vested in the provincial government of Canton.

Swatow is placed in a bay formed by the debouchment of the river Han into the sea, in latitude about 23° 19′ N., longitude 116° 40′ E. It is, in fact, a bay within a bay; the outer or seaward one being formed by the headland known as the Cape of Good Hope on the south, and the island of Namoa on the north. For security and protection from all winds it may vie with any harbour in the world, while, from its extent and depth of water, any number of vessels can find room and anchorage.

A glance at the map of China will show it to be a considerable river. Parties who have proceeded some 40 miles up the main branch, report having found above twelve fathoms water. Situated on the boundary of the province of Kwantung and Fokien, it passes through the highlands of the latter, whilst a branch tending to the southward communicates with the Tongleang river, which falls into the Pearl River at Whampoa, near Canton. It is difficult, however, in the present lack of topographical knowledge of China, to trace clearly its course; but, so far as information, supplied by Chinese of respectability, may be considered good authority, it is unquestionable that the Han communication is open with Canton and other large towns to the seaward, and with the Woo, E, and other tea-districts to the north.

The country forming the delta of the river at Swatow, is low, flat, and almost entirely covered with sugar plantations: the produce of this article is said to be immense, for, in addition to the quantity exported, the home consumption is considerable. The fisheries must yield a large income: an active trade also exists with Formosa, in rice; but with Java, and the Straits, the relations of commerce appear to be most important. During the south-west monsoon, junks arrive from the eastern seas, in large numbers, freighted with mixed cargoes, composed of what is generally called "Straits' Produce," such portions thereof as are not required for the interior, being transhipped into coasting junks, and sent up to the north. I may observe, that until I found this arrangement in operation at Swatow, it was difficult to reconcile the quantities of Straits' cargo seen in northern cities, and the few Singapore junks which appeared to convey it. I was unable to obtain a return of the number of trading junks, and their tonnage, visiting the port during the year, but it must be considerable.

The population of this part of the country is large, and from the connection with the Straits, of a more migratory cast than Chinese, north of Canton, generally are. It is reckoned that not less than 15,000 people emigrated to Batavia, Singapore, and other places in the Eastern archipelago, during the past year: the people appear to be a fine, strong race, and well inclined towards foreigners.

The foregoing return can only be taken as an approximation to the value of the native trade at Swatow, there being many articles in Chinese use unenumerated, but which form a large portion of local traffic.

Moreover, the absence of European interests, save in opium, leaves undeveloped the resources of the place; that these are available to foreign enterprise, the result of my inquiries lead me to believe is indisputable—and that it requires but a demand to produce a supply of tea and other produce. I may add, as repeated inquiries for tonnage have been made by the native merchants, who prefer the celerity

and security afforded by European vessels, to the uncertainty attending their own junks, the probabilities are in favour of the carrying trade, to and from the Straits, being transferred to foreign bottoms, and Swatow, ere long, becoming an important place for foreign commerce, were it opened for that purpose.

28th November, 1853.

COSTA RICA.

REPORT of Mr. Vice-Consul WALLIS on the Trade of Costa Rica for 1853 and 1854. Dated December 31, 1854.

THE means at disposal for making out returns of trade in this country are of the most limited description. Even the Government is in ignorance of the value of the imports and exports, as no value is declared by the party introducing, and no manifest is required by the custom-house prior to clearing a vessel. The returns of exports are exact. Of the imports, however, no further data have been obtainable than the general knowledge common to all the mercantile community of the value, a little more or less, of the importations of each individual composing it. Probably their exact amount would be within ten thousand pounds of the sum estimated by the returns.

1. Punta Arenas is the principal port of the Republic, and, with the exception of some few introductions viâ Grey Town, and Matina on the north coast, the only inlet and outlet for the commerce of the country. Until the pleasure of the Government, this has been declared a free port, and there are no custom-house restrictions to landing and shipping merchandise other than in the cases of tobacco, gunpowder, saltpetre, and munitions of war, as set forth in the second article of this report.

The following articles may be introduced into the country free of all duty:—

Foreign cattle for raising and improving breeds.
Ploughs and harrows for agriculture.
Harness for coaches and waggons.
Quicksilver.
Live birds.
Barrels and casks, empty.
Fire-engines.
Church bells.
Maps and charts.
Waggons and coaches.
Hand-barrows.
Musical compositions.
Riddles or sieves.
Crucibles of all kinds.
Staves for casks or barrels.
Geographical and astronomical globes.
Fusees and matches for mining.
Statues of the size of life.
Stoves for drying coffee.
Green fruit, of all kinds.
Guano.
Lasts for shoes.
Hat-blocks.
Sugar-moulds.
Iron ovens and other assaying instruments.
Printing presses.
Scientific instruments.
Bricks and fire-bricks.
Marble flags for pavement.
Printed books, not interdicted.
Cotton yarn.
Complete agricultural implements and mining tools; as also loose pieces belonging to such, which may

be introduced before or after the machines themselves.
Mineral ores.
Models of machinery and novel inventions.
School copy-books.
Hops.
Gold in bars, paste, or dust.
Paper, ruled for music-writing.
Pianos, and all other keyed instruments.
Mill-stones.
Roofing slates.
Exotic plants or their seeds, and all grain introduced for sowing.
Silver and gold, coined or in bullion.
Lithographic presses.
Wheels for waggons, carts, or coaches.
Empty sacks or bagging; stuff cut in lengths of 75 inches.

together with all and everything required by the Supreme Government.

No duties are recoverable on any exports, with the exception of timber and coffee, as hereafter mentioned.

2. The custom-house regulations of Costa Rica permit the importation and exportation of every description of legal merchandise. Tobacco, being a Government monopoly, can only be landed to sell to the Government. Gunpowder, also, can only be disposed of in a similar manner, no private trader being allowed to remove from the custom-house stores, either the one or the other, unless for export. Munitions of war can only be introduced into the interior of the country with the express permission of the Government. In any considerable quantities they must be stored in the custom-house.

The following articles are prohibited for importation or introduction:—

Fermented juice of the cane.

Obscene engravings, books, or any other objects calculated to offend against public morals.

Fire-arms of all kinds and munitions of war, which can only be imported by special permission of Government.

3. All merchandise other than the articles set forth in clause 1 of this report, are liable to duty, on being introduced from the landing port to the interior of the country, which duties are levied alike on goods from all nations, imported in all bottoms, on the gross weight of the articles introduced, and amount as nearly as possible to twenty-two and a half to twenty-five per cent. on value in Punta Arenas. A new tariff has been recently decreed by the Government, which, while it raises the duty on spirits, almost to a prohibition duty, increases the duties on general merchandise some ten per cent. This tariff to be in force on and after the 30th of June next.

On coffee a toll is exacted of one shilling the 100 lbs., such toll being for the repairs of the road. An export duty of five cents a cubic foot is levied on unsawn timber, of more than twelve Spanish inches square, that size and under being free of duty.

4. Since Punta Arenas was declared a free port, no smuggling of merchandise has been heard of. Some few attempts are made to smuggle tobacco into the interior, but the majority of them have been detected, and for the last five years the revenue has not probably been defrauded in this way of more than three thousand pounds. The laws against smuggling are most stringent, that offence being punished by fine, imprisonment, and confiscation of the contraband article.

5. The customs' revenue amounted in 1852 to 27,314*l.* 18*s.* 6*d.*, in 1853 to 20,105*l.* 7*s.*; returns of 1854 are not yet concluded.

6. On the arrival of a vessel at Punta Arenas, her con-

signee is bound to present her manifest within eighteen hours, together with his bond, that the captain discharges no prohibited goods without the consent of the custom-house officer, and soliciting a permission to proceed with her discharge. In future, and by the new custom-house regulations, to come into operation on the 15th instant, each consignee of goods by the vessel is bound to produce a statement of his imports, stating class of goods, whence proceeding, and value. A custom-house officer may be sent on board while the vessel is discharging, if the head of the custom-house deems it necessary. To clear a vessel, it is necessary to present a manifest and pay port charges.

7. No goods are warehoused in the custom-house other than tobacco, gunpowder, saltpetre, and munitions of war. Warehouse rent on these articles is threepence per 25 lbs. per month.

8. Only three vessels sail under the Costa Rica flag, which are the—

"Tres Amigos"	....	....	142 tons
"San José"	....	....	88 „
"Benancia"	....	....	52 „

all employed in the coasting trade.

9. A small steamer has been recently purchased by this Government, which is now undergoing repairs, prior to being converted into a vessel of war. She is intended to carry 4 guns and 25 marines. She is a small boat, built for river navigation, with more expense than care, and can never be made serviceable for anything more than a revenue cruiser. Her measurement is 44 tons.

10. The harbour of Punta Arenas is formed by a large gulf, perfectly sheltered on all sides but the south, offering a safe anchorage for vessels of any size. Merchant-vessels usually bring up in five to six fathoms, about one and a half to two miles out from beach. Small vessels, by rounding the Point, can enter the estuary to the north of Punta Arenas, where there is eighteen feet of water, and where vessels can lie perfectly sheltered from any wind. To enter

this estuary a bar must be crossed, on which there is six to sixteen and eighteen feet of water at low, high, and spring-tides respectively. The prevailing wind being from the south, vessels may enter much more readily than leave it; and they most frequently wait two or three days a favourable wind to run out.

11. Vessels in Punta Arenas, as already mentioned, anchor in the roadstead in five or six fathoms, with thirty fathoms of chain, in a direction due south from the light-house, and one and a half to two miles from shore. The roadstead is so completely landlocked, that, except in the event of a hurricane, a vessel can be considered in perfect safety. The only strong wind is from the north, and vessels, in the event of dragging, have ample time before reaching the opposite shore at the entrance of the gulf, a distance of nine miles, to trip their anchors, and get sail on the vessel. The currents set to west and east at ebb and flood tides, running some four knots an hour, and, therefore, exposing vessels at anchor to no danger.

12. The best charts of the west coast and of this harbour are by Sir E. Belcher, published in 1846.

13. A vessel, on entering the gulf, should steer for and hug the east coast, where the set of the current is not so strong, and she is more likely to have the land-breeze at night; and when well into the harbour she can bear up for the anchorage, which should never be to the westward of the light-house. Dangerous banks exist to the west and south of the Point of Punta Arenas, on which the current sets with great rapidity. She will only require a pilot in the event of entering the estuary.

14. The only charges of a public nature on vessels of all nations, loaded or in ballast, are the following:—

Light dues . . .	3*d.* per ton.
Hospital . . .	4*s.* per man.
Clearance . . .	1*l.*

15. Quarantine regulations are rarely enforced at Punta

Arenas, on account of the repugnance of the inhabitants to placing any difficulty in the way of vessels arriving. For the last six years, although the occasion for such regulations has frequently existed, they have only once been enforced, when a vessel had to lie forty days at the neighbouring island of San Lucas.

16. For the careening and repairing of vessels, the estuary of Punta Arenas, and the islands in the immediate vicinity, offer very great natural advantages; and that port is very frequently selected for this purpose, as being the most favourable between San Francisco and Guayaquil.

17. Provisions of all descriptions, and water, may nearly always be obtained in Punta Arenas, at a very moderate price. The officers of vessels of war that have visited the place, for the purpose of taking in stores, have invariably spoken highly of the port in this respect.

18. There are no banking establishments in Costa Rica. Great anxiety is exhibited on the part of this government to assist in the formation of one on a small scale, in which they would gladly place 20,000*l.* of capital, and legislate in favour of it, by decreeing entirely new laws for its guidance and protection, which would be of the first necessity. It is almost needless to observe that such an establishment would be of incalculable advantage to trade, as the majority of the coffee-growers are at present under the necessity of sacrificing, at a low price, the crop of the ensuing season, in order to obtain the means to keep their estates cleaned and prepare their crops.

19. Sales of merchandise in this country are very rarely effected for cash. They vary from three to twelve months, and in some comparatively rare cases even more. Six months, however, is the customary credit. Discount for cash is very seldom required, but when demanded it is usually done at the rate of 1 per cent. per month.

20. Parties establishing business in this country have no legal forms to go through prior to doing so. A tax is levied on the wholesale establishments in the interior of 8*l.* per

annum, in Punta Arenas of 40*l.* per annum; and parties disposing of foreign liquors in any quantity are liable to a further tax of 60*l.* per annum.

21. The commissions customarily charged in this country are as follows:—

On purchase of coffee or other produce, including the forwarding to the coast	3 per cent.
On advances for expenses	5 „
On forwarding produce to the coast	½ „
On shipping coffee or other produce	½ „
On purchase of merchandise	3 „
On private sales and sales by auction	5 „
On goods received and forwarded (on value)	1 „
On consignments of merchandise withdrawn, on invoice	2½ „
On debts and accounts collected	5 per cent.
On sale or purchase bills, exchange	1 „
On freight or charter, procured for vessels, and freight or passage money collected	5 „
On ship's disbursements, or outfits	5 „
On money obtained on bottomry or respondentia	5 „
On insurance effected	½ „
On guarantee on sales or purchase by special arrangement only	5 „
On sales of coffee	3 „
On storage of coffee, per sack of 125 lbs.	9*d.* „
On storage of goods on amount sales	1 „

22. There exist no obstacles to the establishment of foreigners as merchants or manufacturers in this country; the latter, in all probability, would be particularly favoured by being allowed to introduce their raw material, free of duty, for a term of years.

23. The influx of labourers is not attended by any regulations; all descriptions are scarce in the country, and much wanted. The average rate of wages of artizans is as follows:—

Carpenters, per diem	12*s.*
Painters	10*s.*
Masons	12*s.*
Blacksmiths	12*s.*

Native field labourers are scarce at 2*s.*; of foreign, there is little, principally English, and brought out expressly for the purpose, at about 60*l.* per annum. These are generally a superior class of men, and act in some measure as overseers of an estate.

24. Immigration, though very much needed, meets with very little encouragement in this country. The government and the people would be very glad to have it, but have never shown any disposition to assist in any plan proposed by foreigners with this end in view. The only introduction of foreigners has been in the year 1853, when about sixty Germans, principally labouring men, were brought out under the auspices of the Berlin Colonization Company. This company has, *de facto*, ceased to exist; and the majority of the labourers being of a bad description, who expected to find here a second California, have left the country in disgust.

25. Insurance companies do not exist in Costa Rica. A large part of the property in Punta Arenas is insured against fire in England and in Hamburg, at from 1 to 2½ per cent. No objection exists on the part of the insurers to take risks in the interior of the Republic; but disasters by fire are so very rare, from the nature of the buildings, that the owners do not desire to effect it. An agency is in Punta Arenas for the Royal Fire and Life Insurance Company.

26. Bankruptcy, until this year, has been of very rare occurrence in Costa Rica. This year there have been four or five bankruptcies: two for 14,000*l.* to 16,000*l.*; the remainder for smaller amounts. In such a small trading community as that of Costa Rica this must be considered a very large number. The most prevalent cause of bankruptcy is overtrading. It is to be ascribed in all cases that have occurred here, rather to the imprudence (not to use a harsher term) of the bankrupts than to misfortune.

The laws affecting bankruptcy are so exceedingly defective that very few bankrupts obtain a discharge of any sort. Up to the present time, there is no bankrupt or person that has

been bankrupt that has a discharge from his creditors. He fails, summons his creditors, who put the matter generally into court, and while the slow machinery of their defective laws is working, there is a general scramble on the part of the creditors, who each get what they can. The bankrupt himself, in nearly all cases, retaining possession of his goods and property, from which no one of the sufferers is willing to take the lead in ousting him. The defective state of the laws may be estimated when it is considered that not one bankruptcy has ever been wound up in this country; and they call for a most thorough reform, which has been repeatedly represented to the government, but, while the necessity is admitted, nothing is done.

27. The average amount of the fortunes of the higher classes of merchants in Costa Rica may be estimated at twenty-five thousand pounds, mostly consisting of landed property; and if the false value given to that description of property might be taken as correct, this amount would be doubled.

28. There has been no census taken of the population of Costa Rica. At the time of the Independence it was estimated at one hundred thousand souls, which number, it is supposed, is now more than doubled, from the fact of this State having suffered from no epidemics or wars, since that period. It is worthy of remark that the cholera has never been in this state; it has committed great ravages in every state in Central America; but although having reached the borders of this Republic (Masaya), it has never passed the Cordillera. Its absence in the interior may be accounted for by the elevation of the table-lands 4,500 to 5,000 feet above the level of the sea, but no cause can be assigned for its not having visited the coasts, and the towns lying near the coasts.

29. There is only land communication in Costa Rica, and that of the worst description. The management of the roads has been in the hands of corporate bodies up to the present time, who from want of experience and application

have wofully misapplied the large funds entrusted to their management. The road dues levied on the road to Punta Arenas amount to from five to six thousand pounds per annum, which is supposed to be expended on the repairs of it. The Government has recently altered this arrangement, and the Minister of Finance is now the head of a Board of Works, whose work is superintended by a competent foreign engineer, under whose able superintendence the roads are improving much, and if his views are carried out by the Government, as it is hoped may be the case, in the course of two or three years, a bad piece of road will be as rare as a good piece has been until now.

The only article of export worthy of note is coffee, of which the crop ranges from sixty thousand to ninety thousand quintals. This is grown for the most part in the immediate neighbourhood of the capital, San José, whence it is carted, in small ill-constructed carriages, drawn by one pair of oxen, to the port of Punta Arenas, a distance of eighteen or nineteen leagues. These carriages carry from ten to fifteen quintals each, and occupy, in the summer weather, when the roads are dry, four to five days on the journey; if the rains set in early, as is sometimes the case, the coffee cannot all be prepared before the roads get so bad as to be nearly impassable for carts, and as was the case in 1852, a large part of the crop remains in the interior until the following year, causing immense loss. In 1852 as much as ten to twelve thousand quintals remained in the interior from this cause. The cost of carriage to the coast varies from four shillings to one pound the cargo of 250 lbs. The latter price is rarely paid, and the average cost of sending down a parcel of five thousand quintals may be estimated at six shillings the 100 lbs. All charges in the port of shipment are covered by one shilling the sack of 125 lbs.

30. Freight from Punta Arenas to London is on coffee six pounds per ton; on timber five pounds per ton; and hides, and the few other exports, in proportion thereto.

31. The large majority of the trade of this country is

with Great Britain. It might be benefited by the Government of this country throwing open the monopolies of spirits and tobacco. Of the former there is a very large consumption in this country, which is now made to produce to the Government a revenue of about thirty thousand pounds on the sale of spirits made from cane alone; other spirits and liqueurs being imported. After the 1st July this importation is virtually prohibited, by the high rates of duties then to be levied on these articles, and every description of spirit and liqueur is to be manufactured in this country, and form a Government monopoly. This country offers great advantages for the cultivation of a very superior class of tobacco (which, if not monopolized by the Government, which cannot furnish enough even for the consumption, would be cultivated to as great an extent, and with as lucrative result, as coffee is at present,) for exportation as with the coffee for England. This Government would be glad to sell the monopoly of the tobacco to any party guaranteeing them the revenue this branch produces, or about twenty-six thousand pounds; but of course it is not to be expected that the parties taking up such an engagement would be protected in their enterprize, as the Government protects itself.

Trade would also be materially benefited by steam communication with the neighbouring parts of Central America. At present any commercial relations with these places is out of the question, from the want of opportunity even to communicate. It is a common occurrence for letters to be three months on the way from Guatemala to this, and *vice versâ*.

32. To the amount of estimated values of goods imported at Punta Arenas, must be added about ten thousand pounds per annum for value of introductions *viâ* Grey Town and Matina. It will be seen by a glance at the returns, that the imports exceed the exports by a considerable sum, and as the large majority of the former are from Great Britain, this state is very largely indebted to that country, and this debt is increasing annually. Should any difficulty occur in the recovery of these debts, the laws of this country, and their

administration are so defective, that a foreigner can hardly expect to reap any benefit from an appeal to the courts. In this small community there is such a ramification of relationships and connections, that it is next to impossible to find an impartial judge to decide upon any legal case, and this difficulty is increased from the number of courts a case may be carried through before it is finally decided.

33. The proportions of imports of goods from different countries may be estimated as follows:—

From Great Britain	69 per cent.
„ France	$5\frac{1}{5}$ „
„ Germany (Hamburg)	$4\frac{4}{8}$ „
„ Spain	$1\frac{1}{8}$ „
„ the United States	7 „
„ Chile	1 „
„ Ecuador	$1\frac{3}{8}$ „
„ Guatemala	$4\frac{6}{8}$ „
„ Nicaragua	$2\frac{3}{8}$ „
„ Salvador	$3\frac{4}{8}$ „

34. On the whole, there can be little doubt that the commerce of this country, which has been in a most thriving condition ever since it was opened, has already reached its climax, and is now on the decline. The importations in the ensuing year will not probably equal in amount the half of those of past years. The stocks of goods in the country form in amount the half of the importations of this year. Prices are on the decline, and the demand for goods has very much decreased from what it has been heretofore. This decrease is to be attributed to the high price of provisions during the last year, which leaves the bulk of the people little to spend in wearing apparel. The consumption of merchandise has been and still is surprisingly large. In one year the imports exceeded two hundred thousand pounds, to which fifty per cent. may be added for value in this; giving a very large sum for the expenditure of each individual composing the population. The high price of provisions may be attributed to the descent of locusts into the

country this year, which consumed large quantities of corn, &c. The energetic measures taken by the Government to destroy them, have succeeded for the present, but it is very likely they may return in 1855, and it is to be doubted whether the Government every year can be at an expense of about sixteen thousand pounds to destroy them; and allowing that to be the case, still more doubtful whether they can be destroyed if they visit the country in any quantities, as they have done in the neighbouring states.

The natives are essentially a commercial people, and as until of late years, the introduction of foreign merchandize was a most profitable business, all the people in command of a very small capital rushed into that pursuit, and the competition being immense for so small a country, credits were given recklessly, the bankruptcy of some few succeeded, and the present depression of trade is the result. Some of the leading men suppose the depression to be temporary, caused only by the high price of provisions, and the number of competitors; but it is much to be feared that it will continue for some years to come, until many of the small merchants are driven to the expedient of failing, and thus out of the market. The exportable products in this country do not equal the imports, and in consequence there is a continual brisk demand for the only export of any moment, coffee, which is driven up to most extravagant prices. Merchants, therefore, almost without any exception, make losses on their remittances, assuming their remittances at their value in the port of shipment. In general the half of the crop is purchased six months before the date of its delivery at proportionately low prices, and it is only by these means, that shippers can bring down the cost of their whole remittance to a figure that does not leave a loss. For the last two years coffee has been sold in San José frequently at the price it nets in London, purchasers at such a figure, who are numerous, losing all the charges on the forwarding to the coast. This loss, of course, being in part compensated by the low prices of their first purchases. The reckless system

of credit adopted here some time back and maintained until recently, is most injurious to trade. It may be said that only two pursuits are followed in the country; those of raising coffee and trading in dry goods. As coffee-estates could not be purchased with facility, and carried on without capital, and no difficulty existed in obtaining credit for merchandise in the country, and but little, unfortunately, in doing so in England, paying for the goods out of the proceeds, and as formerly trading was a much more lucrative pursuit than agriculture, the majority of the people obtained credit and became traders. Until this is altered, and there are fewer traders and more agriculturists, or until the value of the exports exceed that of the imports, the present depressed state of trade must continue. This alteration, it may be expected, will work itself out in about five years, and until then no permanent improvement need be looked for.

EQUATOR (GUAYAQUIL).

From the Report of Consul-General Cope, on the trade of the Republic of Equator through the Port of Guayaquil, for 1854, it appears that the interior condition of the Equator, the state of the population, and fiscal laws, have undergone no change during the last year, and consequently the nature and extent of its commerce have remained about the same as they were during the year preceding (1853).

If there has been a small decrease in some articles of importation, it has been compensated for by an increased importation of others, so that, upon the whole, the duties collected at the Custom-house at Guayaquil, have produced somewhat more than during the previous year, viz., the duties collected at the Custom-house at Guayaquil during the last two years, amounted in 1853 to 80,744*l.*, and in 1854 to 84,099*l.*

In the exportations, the principal difference noticeable is an increase of the exportation of gold and silver coin, resulting from specie received from the coast of Mexico, in payment of goods sold there by the Guayaquil traders; and from gold coined at the mint of Quito, the produce of mines in New Grenada, and received from thence in exchange of articles, the produce and manufacture of the Equator.

Statement of the quantities and value of the various articles, the produce of the Equator, exported during the year 1854:

Articles.		Quantities.	Price.	Value.	
				£	s.
Cocoa	ggls.	137,975	6 dollars	137,975	0
Straw hats	dozen	36,606	20 „	122,020	0
Timber	logs	23,130	5 „	19,275	0
Mangles	poles	8,033	4 rs. each	693	10
Tanned hides	halves	22,992	2 dol. each	7,664	0
Flax	lbs.	17,828	2 reals	743	0
Tobacco	ggls.	2,594	28 dollars	12,124	0
Bark	ggls.	2,107	8 „	2,809	5
Sarsaparilla	ggls.	373	14 „	870	5
Orchilla	ggls.	424	10 „	706	10
Pumice stone	hundred	40,122	6 „	4,020	5
Bamboos	number	91,134	1 real each	2,527	10
Coffee	ggl.	633	10 dollars	1,055	0
Horse rugs	vs.	1,030	2 reals	43	15
Coarse woollen	vs.	14,800	2 „	616	10
Dressed sheep skins, Pelonese	number	2,535	3 dollars	1,257	10
Firewood	hundred	286,600	6 reals	2,862	15
Lard	ggl.	221	20 dollars	736	0
Miscellaneous	..	..	..	738	9
				318,748	4
Gold and silver coin	..	..	..	41,134	0
				359,882	4

Observations on some of the chief articles in the preceding statement.

Cocoa:—The crop has been a short one this year, but the price has kept up accordingly, and the planters have done as well as if the crop had been more abundant.

Straw hats:—The quality exported has been better than formerly, and the demand for them continues.

Tanned hides:—Peru consumes all that the tanners of Guayaquil can furnish; they could export more if there was a greater supply of raw hides.

Bark:—The produce is not equal to the demand, though many inferior sorts are taken; brown, gray, and red are the best qualities exported from the Equator; the last is difficult to obtain.

Tobacco:—The produce is not equal to the demand, though the price has continued to increase.

Timber:—A species of oak, cut in logs, measuring about 20 cubic feet each; the demand for it, both in Chili and Peru, is considerable.

Orchilla:—There has been little demand.

Coffee:—The cultivation of coffee is on the increase, and the quantity produced is good; the scarcity and high price of labour prevents the exportation of this article from being much increased.

Lard:—A new article of exportation, consumed at Panama.

EQUATOR (SANTIAGO).

From the Report of Mr. Vice-Consul Cunningham, on the trade of Santiago for 1854, it appears that the consumption of foreign goods in this province continues gradually to increase, and is now estimated at the value of about a million and a half of dollars per year.

The produce for export, consisting of wheat, flour, barley, and wool, has received a considerable augmentation by the quantity of coal now exported from the mines of Lota and Coronel. The crop of grain now being harvested, is said to be very large, indeed much more so than in any former year.

The land to the north of the river Bio Bio, is being

rapidly cleared of timber in all directions for the purpose of sowing grain, for which only it is suitable, on account of the dry nature of the soil.

A considerable quantity of grain has, during the past two years, been raised on land on the south bank of the river Bio Bio, in the Indian territory, where the ground is much more fertile than the north; and a trade of a very considerable importance is being established with the Indians, in barter of European goods for cattle and wool, which, if conducted with energy and judgment, would probably lead to the rapid civilization of the Indians, without the necessity of resorting to violence, as the greater part of the Indian men now speak the Spanish language more or less.

In consequence of an exclusive privilege granted by the Chili Government during the past year, for the navigation of the river Bio Bio by steam, a boat suited for the purpose was obtained from California, and placed on the river, but although not drawing more than sixteen inches of water, could not proceed up the river on account of the lowness of the water this year, so that, after several attempts, the boat is now on a sand-bank, about two miles beyond the city of Concepcion, where she will have to remain until the river rises by the rains of April.

The whole of the wool exported from the province is shipped to the United States; several attempts have been made to purchase wool for the English market, and small quantities have been remitted as experiments, but the results have always been unfavourable.

Wheat is shipped to Peru and Australasia, and flour to Australasia and California.

During the past year a company of millers in this province shipped large quantities of flour to the Californian market, which remains unsold, and by which it is supposed they will suffer a heavy loss.

3*rd February*, 1855.

HOLLAND (ROTTERDAM).

Extract from Commercial Report of Consul Sir James Turing, on Trade of Rotterdam for the year 1854.

The forbearance of the belligerent Allies in regard to the strict execution of blockades of Russian ports, gave rise to some activity in the spring of the year, and Dutch shipping then reaped some considerable benefit from the neutrality of the flag, having been employed to bring home Russian produce as well to Holland as to British ports.

Dutch ships have likewise had a fair share of the trade to Memel and other Prussian ports, which, since the more rigorous application of the blockade, have served as depôts for merchandize to and from Russia.

Ship-building in the Netherlands has been followed up briskly during the greater part of the year, but towards the close, contracts have somewhat abated. The number of new ships of all classes launched in the course of the year, amounts to 220, measuring 27,318 lasts, or 54,636 tons, against 183 ships, measuring 21,713 lasts, or 43,426 tons in 1853.

The total amount of merchant ships, including 17 steamers, and after deducting 110 ships lost at sea or superannuated, is now 2,156 vessels, measuring about 519,016 tons, against 2,037 vessels, measuring 479,200 tons, at the 31st December, 1853.

The principal importations from the Netherlands eastern colonies, were, coffee, of the value of 2,640,000*l.*; sugar, 1,455,315*l.*; indigo, 312,880*l.*: tin, 479,000*l.*, &c. &c. The total value of the imports from these colonies amounts to 5,224,280*l.*

Although an abundant grain harvest seemed likely to provide sufficiently for the wants of the country, it soon became evident that old stocks had been so extensively encroached upon, that a prolongation of the decree admitting imports of grain at the reduced scale of duty would be

required, and the period was accordingly extended till the last day of the year.

The total of ships of all flags cleared inwards and outwards with cargoes and in ballast in Netherland ports during 1854, is as follows, compared with 1853, viz. :—

	Inwards.	Outwards.
1854	7,602 ships.	7,824 ships.
1853	6,877 „	7,094 „
	Increase . 725 ships.	Increase . 730 ships.

The local improvements during the year are chiefly confined to the completion of enlarged docks for merchant ships, and the opening of a communication by steam with the terminus of the Antwerp Railway, by which means travelling from one place to the other is abridged by about one-half of the period previously required.

A law in progress through the Legislative Chambers, enacting a considerable simplification of the tariff of exports and imports, and a material reduction of tonnage dues on ships, will likewise in all probability soon be adopted.

An active trade from Schiedam with the Baltic ports prevailed during the spring of the year.

At Dort trade has undergone no material alteration.

The exchange on London during the year has averaged 11·59½ f. per pound sterling for long, and 11·69½ f. for short bills.

31*st December*, 1854.

IONIAN ISLANDS (PATRAS).

Abstract of Report from Mr. Consul Wood, on Trade of Patras, Pyrgos, and Calamata, during the year 1854.

Imports.

In 1854, 443 vessels (British and Foreign) of a total tonnage of 32,573 tons, entered the port, the value of their

cargoes being 64,002*l.* These figures show a decrease for the year 1854, as compared with 1853, of 157 vessels, of 22,301 tons, and 18,736*l.* in value of cargoes.

The British proportion of this trade was about two-fifths, and exhibited a corresponding diminution.

Exports.

The number of vessels (British and foreign) cleared from the port of Patras in the year 1854, was 439, having an aggregate tonnage of 34,616 tons, the value of the cargoes being 100,570*l.*, being a falling-off, as compared with the returns of the previous year, of 159 vessels, 19,663 tons, and 93,096*l.* value of cargoes. The British proportion of this trade was about two-thirds, and shows a decrease of about 50 per cent. as compared with 1853.

It must be borne in mind, however, that these figures are to be considered, from the nature of the returns from which they are derived, and from other causes, as approximate only.

The imports and exports by Ionian vessels maintained nearly the same position as in 1853.

At Pyrgos the imports in foreign and Ionian vessels amounted to 14,000*l.*, the exports being about 10,000*l.*, and at Calamata the total imports were of the value of about 22,000*l.*, the value of the exports being nearly 10,000*l.*

The decrease to be observed on the side of the British trade arises principally from the failure of the currant crop, by which all classes of the community were impoverished, and no encouragement afforded to speculators to import the usual supply of goods. Great interruption of trade was also experienced from the invasion of armed bands from Greece during the spring, from which cause the trade with the Gulf of Prevesa was entirely suspended for a time. This traffic, which was to a considerable extent in manufactured goods, has only lately been resumed.

The export trade in currants was particularly depressed

in consequence of there being no stocks on hand of the previous year's fruit. The disease of the currant vines prevailed particularly at Patras, Vostizza and Pyrgos, although at the two latter places the result was less disastrous, the produce of these two districts amounting to about 1300 tons, of good quality, the greater part being sold in England at remunerating prices.

The improved appearance of the crops, however, leads cultivators to hope that the disease is on the decrease.

Owing to the severe losses of speculators in sending inferior fruit to England in 1852—3, almost the whole of the blighted quality of currants has been distilled on the spot, a fair description of spirit having been extracted, which has been sold at double the usual price, in consequence of the failure of the vine crops in France and Italy, and the consequent scarcity of this description of spirit; this will partly account for the limited amount of shipping employed in 1854, and the decrease of the quantity of fruit shipped.

The Ionian agriculturists, however, are now turning their attention to other crops, and the cultivation of the olive is greatly on the increase; and the greater variety of the productions of the Morea will, it is to be hoped, go far to check any calamity arising from blight or failure of a particular crop.

There appears a disposition on the part of the Greek Government to remove the restrictive and objectionable laws in respect of export duty and dimes, which are so injurious to British interests; and the Royal speech at the opening of the present session of the Chamber of Deputies contained a proposition for placing a fair amount of duty at a fixed rate on the currants exported; and the effect of this measure, it is to be hoped, would be most beneficial.

It is also in contemplation to substitute a fixed land tax in lieu of the system of farming-out which has hitherto prevailed to the great general detriment; the culture of the land being, to a considerable extent, abandoned in conse-

quence of the exaction and extortion to which the peasants were subject.

Prices of imports from England have been generally higher than last year, owing to the limitation of the quantities imported.

The prices of the produce of the country show a material increase. Much of this is owing to short crops, and also to the impossibility of obtaining the usual supplies of wheat and corn from the Levant and the Black Sea. In consequence also of the war, speculators are holding back, and this induces higher prices. There is a heavy export duty on grain, amounting almost to a prohibition.

The fig crop at Calamata has been good, the principal export being to Trieste and the Levant, in consequence of the shortness of the crop in Smyrna. But few figs have been exported from Calamata for the English market, the quality being inferior. The quantity of figs exported in 1854 amounted to 3,600 tons, valued at 30,856*l.*

But little valonia has been produced, and that of inferior quality; and the stocks in England being very large, there has been but little encouragement to ship. Speculation in this article has, however, been somewhat encouraged by low freight.

The produce of oil at Calamata was considerable. The quantity exported amounted to 9000 barrels, valued at 26,000*l.*

The produce of silk in the Morea last season was very large, and was mostly purchased on foreign account, and shipped for Marseilles and Ancona. It realised full prices. The value of the silk produce of Calamata was estimated at 16,213*l.*

The winding of the silk in Greece is badly managed, and the quality often spoilt by the admixture of the coarser parts of the cocoons.

British shipping was abundant during the year, from the quantity of coals, &c., brought out to Malta, and the want of

return cargoes of wheat, &c., from the Black Sea. Freights for currants averaged 45*s.* per ton.

The exchange on London fluctuated but little during the year,—the average rate being 28 drachmas per pound sterling.

The Greek Steam Navigation Company, formed in 1853, has not purchased any steamers, on account of the unsettled state of the country; it is believed, however, they will shortly purchase some steam-vessels for this purpose.

LUBECK.

Extract from Report of Mr. Vice-Consul Blackwell, on the Trade of Lubeck during 1854.

During the whole of last summer the merchants of this city were constantly complaining that the blockade of the Russian Baltic ports, and especially those of Finland, would be the ruin of Lubeck. They admitted that their trade with Russia was still carried on, to a certain extent, through neutral ports, but contended nevertheless that the trade of Lubeck in general was declining, and must necessarily decline until peace was restored. The customs returns for 1853 and 1854 show that these complaints were groundless; the imports both by land and by sea having, in spite of war and blockade, actually increased in 1854, though the increase would, no doubt, have been more considerable if the blockade in the Baltic had not existed.

The customs return was, in 1854, an excess in the total amount of imports of 9,650¼ tons, or of 7·8 per cent., over 1853. But the arrangement of the goods as rated, affords a much better criterion for a fair comparison; and according to this arrangement an increase appears of 13¾ per cent. in the imports over the previous year.

It might naturally be supposed that the Lubeck timber

trade would have suffered materially by the blockade of the Finland ports, yet such is not the case, a large supply of timber having been obtained from Sweden, though part of it may probably have been Finland timber shipped in Swedish ports. Spars, rafters, and laths, which are rated *ad valorem*, certainly show a decrease of 1,583*l.*, or 8¼ per cent.; but on the other hand, deals and planks show an increase of 3,750 dozen, or 4⅖ per cent.

The great increase in bricks, of 132·23 per cent., is owing to the additional quantity having been required in the construction of the new harbour and the gas works.

On 20 of the principal articles of Russian produce, 1854 shows a decrease of 2·426 tons, or 22 per cent., though on tar there is an increase of no less than 1715¾ tons, or 53⅘ per cent., considerable quantities having been imported at the latter end of summer, from Haparanda, to which neutral port the tar was sent from the ports of Finland in small coasting vessels.

Although in 1854 there was no communication by steamers between Lubeck and Russian ports, the shipping return shows, nevertheless, but a very slight decrease, 61¾ lasts, or 297 per cent. in the total tonnage of steamers. In the sailing vessels there is an increase of 42 in the number, though a decrease of 2,226 lasts, or 5⅗ per cent. on the total tonnage.

The tonnage of sailing vessels from Russian ports shows a decrease of 12,742 lasts, or 86⅕ per cent. There is also a decrease of 312 lasts or 39⅘ per cent. on the tonnage of vessels from Dutch and Belgian ports; and a decrease of 227 lasts, or nearly 20 per cent. in the tonnage of vessels from French and Portuguese ports. But the tonnage of sailing vessels from all other countries shows a considerable increase; the increase being on vessels, from German ports, 1,070 lasts, or 81½ per cent.; on vessels from Scandinavian ports, 6,533 lasts, or 43⅕ per cent.; on vessels from English ports, 3,432 lasts, or nearly 49 per cent.

In 1853 only 2 English vessels, of the burthen of 175

tons, arrived at Lubeck. In 1854, there were 10, of the burthen of 1,324 tons.

There has also been an increase on most articles of commerce imported from England. For instance on—

	Increase.
Pig iron	80 tons.
Wrought iron	120¼ „
Coals and coke	4,459 „
Salt	1,623 „
Soda	140 cwt.
Alkali	66¾ „
Linseed oil	577¾ „

being an increase on the total amount of these seven articles, of 46⅔ per cent.

There is every prospect, should peace be restored, that the trade will considerably increase, especially the transit trade, which will be greatly facilitated by the improvements that have been made in the harbour. The new harbour was opened last autumn, and is, comparatively speaking, very capacious. Along the quays of both the new and the old harbours, lines of rails have been laid, and connected with the terminus of the Lubeck and Buchen Railway by a bridge over the Trave, which was nearly completed when the frost set in, so that early in spring vessels will be able to discharge their cargoes on the railway itself, which will naturally be a great saving of both time and money. It is also hoped that the projected prolongation of the line over the Elbe, from Lauenburg to Luneberg will be sanctioned by the Danish Government, in which case Lubeck will be placed in direct railway communication with Hanover and Rhenish Germany.

The clearing and deepening of the Trave is at length completed, and the river has now a depth of 14 feet from Lubeck to Travemünde, and of 18 feet from thence to the sea, a depth which will be constantly maintained by means of steam-dredging machines. I may also observe that since Christmas, Lubeck has been lighted with gas, so that, on the

whole, this quiet and quaint old Hanseatic city shows unmistakable signs of increasing prosperity.

March 9, 1855.

MEXICO (ACAPULCO).

Extract from the Report of Mr. Consul Withen, on the Trade of Acapulco during the year 1854.

The amount of import duties for the year has been 35,198 dollars, or 7,039*l.* 12*s.*

That of export duties 571 dollars, or 114*l.* 4*s.*

Many vessels would have been chartered by the Mail Steam Ship Company to bring out coal from England to this port; but, on account of the state of blockade, they were afraid of having difficulties hereafter with the supreme government relative to the duties to be paid, which of course would have been exacted by the revolutionary party on the arrival of the vessel at this port.

The high freights demanded on account of the war was doubtless another reason; and they may wish to wait, if possible, for a more favourable opportunity.

Fortunately the Company had a very large stock of coals on hand in this port when the revolution broke out; and their boats have been able, with an occasional interruption, to touch regularly for a supply of it.

The depôt of coals in this port is of great advantage for the war-steamers passing along the coast. The charge per ton is forty dollars, or eight pounds sterling, which, under the present circumstances, is not considered an exorbitant price.

Many improvements were in progress at the beginning of the year, such as the building of a pier in the bay, and the mending of the roads, particularly of that leading to the city of Mexico.

These works were abandoned on the Pronunciamento being made in the month of March.

Had the country been quiet, an express would have been established between this port and that of Vera Cruz, in connexion with the steamers from New Orleans, and with those from this to San Francisco, and supported by subscriptions from the principal mercantile firms in San Francisco.

This will doubtless take place when tranquillity is restored, it being the quickest means by which the merchants in California can receive intelligence from Europe and from the United States.

31*st December*, 1854.

MEXICO (SAN BLAS AND MAZATLAN).

From the Report of Mr. Consul Baron, on the Trade of the ports of San Blas and Mazatlan for 1854, it appears, with reference to such information as I have been able to procure from private sources, it may be asserted that the British trade, in connexion with the western coast of Mexico, has suffered no material alteration in the course of last year. In its limited extent it is constantly affected by the unsettled state of this country, a high tariff, with its restrictive regulations, and the prevailing repressive fiscal laws, which circumstances combine to check every tendency to an extension of commerce, and a corresponding increase in the staple articles of consumption.

But this is no innovation upon the settled principles, which, in this respect, have guided most governments that have succeeded each other in Mexico; and with the exception of the short-lived administration of Señor Ceballos, which, under the personal influence of that enlightened statesman, introduced some important reforms in the tariff, but which were soon after annulled, no political party ever appeared to be firmly impressed with the necessity of esta-

blishing a more liberal system in the commercial relations of the country with foreign nations.

The government of General Santa Anna stands foremost in its endeavours, not only to maintain the narrow views so prejudicial to commerce, entertained by former governments, but even to confirm them with the adoption of more stringent measures. Of this nature is the law published on the 31st of January last, prohibiting the transmission of foreign goods from one Mexican port to another, even under Mexican colours, by which the coasting trade, already reduced to very little importance, in consequence of the depressed state of business, will become still more insignificant. The promulgation of the law in question is destined to remedy (according to general opinion,) certain abuses, which are countenanced by the chief authorities of some ports, especially that of Guaymas, and which consist in granting facilities to parties importing large cargoes of dry goods, by making a reduction on the duties established by the tariff, and thus enabling them to re-export the same goods with the customary permit to other ports, where the same advantages are not to be obtained. Following this principle, it would appear that the law rests upon the acknowledged inability of the government to prevent a breach of good faith among its own chief officers and subordinates; and that in its anxiety to correct one evil, which it has not the power to suppress, another is inflicted on the unoffending owners of vessels engaged in the coasting trade.

Since the commencement of hostilities with Russia, the export of specie from this coast has been considerably less. This has been occasioned by the absence of British men-of-war during the greater portion of last year, which has induced merchants to send their treasure across the country to Vera Cruz and Tampico, in preference to retaining their funds on this coast, without a positive assurance of a safe opportunity offering for an early shipment.

20*th March*, 1855.

NAVIGATION ISLANDS (SAMOA.)

Extract from a Despatch addressed to the Earl of Clarendon by Consul Pritchard, dated Samoa, December 31, 1854.

During the year now closing commerce has greatly increased at Samoa. The people are now making cocoa-nut oil in great abundance. The number of European merchants is much larger than heretofore. These islands will, doubtless, ere long, become exceedingly important to commercial interests.

NORWAY.

Review by Mr. Consul-General Crowe of the Trade of Norway for the year ending the 31st December, 1853.

The year 1853 was a golden year for the trade and navigation of this country.

Every branch of industry flourished, and afforded rich harvests.

The exports, as well as freights earned by the ship-owners, produced more than sufficient to pay for the usual imports.

Money flowed into the country in abundance, the circulating paper currency, which, as in England, is regulated by the amount of bullion deposited in the cellars of the Bank; increased by the large sum of 1,156,000 spd., so that, at the end of 1853 the circulating medium had increased to the sum of 6,796,892 spd., or to about one million more than it had reached in any former year.

This abundance of money naturally had a beneficial influence on the exchanges; as money flowed into the country in excess or accumulated for Norwegian account abroad; foreign creditors diminished; fewer remittances were required to meet the payment for the goods imported into the country; consequently the exchange on Great Britain and Hamburg ranged greatly in favour of Norway, and at one time fell below par.

The following table, showing the average rate for 1846, 1853, and 1854, will more forcingly illustrate this fact.

AVERAGE Rate of Exchanges for Bills on London at usance (say Three Months' date) for the Years 1846, 1848, 1853, and 1854, showing the Average Rate for each Month as well as each Year, per Pound Sterling.

Months.	1846.	1848.	1853.	1854.
	Sp. D.	Sp. D.	Sp. D.	Sp. D,
January	4 62$\frac{1}{7}$	....	4 54$\frac{1}{2}$	4 38$\frac{2}{7}$
February	4 65	4 76	4 52$\frac{7}{7}$	4 39$\frac{1}{4}$
March	4 68	4 77$\frac{3}{3}$	4 52	4 41$\frac{1}{5}$
April	4 68$\frac{3}{5}$	4 76	4 52	4 37$\frac{5}{9}$
May	4 66	4 65$\frac{3}{4}$	4 50	4 39
June	4 64	4 73$\frac{1}{3}$	4 47$\frac{1}{3}$	4 38
July	4 69$\frac{1}{2}$	4 73	4 46	4 36$\frac{1}{4}$
August.... ...	4 68$\frac{1}{3}$	4 68	4 47	4 38$\frac{3}{5}$
September	4 70	4 69$\frac{1}{3}$	4 42	4 37$\frac{1}{5}$
October	4 68	4 64	4 40	4 39$\frac{3}{4}$
November	4 67	4 70	4 37$\frac{1}{4}$	4 40
December	4 65	4 73	4 37$\frac{1}{3}$	4 42$\frac{7}{9}$
Average for the year	4 66$\frac{9}{10}$	4 71$\frac{5}{11}$	4 46$\frac{1}{2}$	4 39

This flourishing state of things could not fail developing all the latent resources of the country, and giving an impulse to industrial enterprize, which, but for this favourable conjuncture of affairs, would have lain dormant.

A reference to the various tables which follow, compared with those of preceding years, will more clearly illustrate the fact.

As wood, in its various forms, constitutes the staple export, it was naturally the article most affected in price, and in quantity exported, by the political disturbances of 1848 and 1849. By the same rule, it was the one first benefited by the reaction which followed; this was particularly the case in the year 1853, which stands unrivalled in the commercial annals of the country, both as to quantity shipped and as to prices obtained; even goods which had lain for years as unfit for shipment, were sold at remunerating prices.

The following return shows the amount of the several

descriptions of timber and deals exported during the seven consecutive years from 1847 to 1853, viz.:—

In 1847	was exported	527,894	loads.
In 1848	„	484,744	„
In 1849	„	462,291	„
In 1850	„	530,257	„
In 1851	„	632,727	„
In 1852	„	701,462	„
In 1853	„	775,845	„

From the above it will be observed that the quantity exported in 1853 was 775,845 loads, or 10·4 per cent. more than in 1852; 67·8 per cent. more than in 1848, and 35½ per cent. more than in 1847.

The contrast will be still more apparent if we compare the seven consecutive years above with the five yearly averages of exports of the same article since 1804, viz.:—

The 5 years	from 1804 to 1808	was exported annually	520,000	loads.
Ditto	1815 to 1819	„	322,704	„
Ditto	1820 to 1824	„	341,276	„
Ditto	1825 to 1829	„	382,681	„
Ditto	1830 to 1835	„	397,566	„
Ditto	1836 to 1840	„	496,654	„
Ditto	1841 to 1845	„	540,046	„

The quantity exported to the four chief consuming countries—viz., Great Britain, France, Holland, and Denmark—during the seven consecutive years from 1847 to 1853, appears as follows:—

Years.	Great Britain.	France.	Holland.	Denmark.
	Loads.	Loads.	Loads.	Loads.
1847	115,498	168,849	140,862	82,417
1848	105,007	62,961	151,718	74,328
1849	90,412	127,387	163,402	63,338
1850	102,292	159,858	169,984	79,752
1851	165,024	141,996	186,516	96,018
1852	182,879	177,962	170,363	99,463
1853	246,640	188,399	157,622	112,619

The increased amount of wood exported to Great Britain during the last year is, in some measure, to be attributed to the reduction which, from time to time, has taken place in the import duties on timber, as well as to the additional consumption the general prosperity gave rise to. These facts are sufficient to account for the increase: a further cause, however, may be discovered in the considerable export of Norwegian wood from Great Britain to the Australian colonies, which arose during the year 1853.

The amount of wood under twenty inches in length, called splitwood, exported to Great Britain was—

In 1850	equal to	39,608	loads.
In 1851	„	38,514	„
In 1852	„	29,303	„
In 1853	„	41,624	„

The quantity of oak-bark exported during the same period was as follows, viz.:—

In 1850	was equal to	1716	tons.
In 1851	„	982	„
In 1852	„	1339	„
In 1853	„	1059	„

The next staple and valuable export from Norway is the lucrative produce of the fisheries, carried on along the whole range of coast from its southern extremity, round the North Cape, to the entrance of the White Sea, affording employment and support to a large proportion of the population of the country. The quantities exported during the year consisted of the following produce, viz.:—

Dried stockfish, not salted	....	14,680 tons.
Clip fish dried, salted	....	13,131 „
Cod roes	....	35,230 barrels.
Herrings, salted	....	561,488 „
Other fish	....	56,490 „
Cod-liver oil	....	53,127 „

The principal markets for the stock-fish are Sweden, Holland, Belgium, Mediterranean, West Indies, and Brazils.

Five-sixths of the clip-fish, or Baccalau, is shipped to Spain and Portugal, the remainder to the Brazils; consequently, this article more immediately competes with the produce of the Newfoundland fisheries.

The cod-liver oil was shipped in the following proportions, viz.:—

To Holland	23,327	barrels.
To Hamburg	15,262	„
To Belgium	3,391	„
To Bremen	2,711	„
To Prussia	1,545	„
To Russia	1,427	„
To Sweden	1,211	„
To Denmark	1,181	„

The cod-roes are exclusively saleable in the ports in the Bay of Biscay, where they are used as ground-bait.

The herrings were shipped to the following ports, viz.:—

To Sweden	233,034	barrels.
To Russia	149,939	„
To Prussia	135,870	„

The salted fish consists of cod, halibut, and the cole-fish, or scy (*gadus Carbonarus*), and is prepared for the Russian markets in the White Sea, as well as several thousand tons of fish caught during the summer months on the banks off the coast of Finmark, which the Russian traders are accustomed to purchase direct from the fishermen, and to salt in bulk in their own vessels, paying in exchange rye-meal, fishing-lines, duck, and other indispensable necessaries. From the nature of this traffic, no regular returns can be obtained; but, as a proof of its extent, no less than about 400 to 500 Russian vessels were off the fishing banks in Finmark during the summer of 1853.

Besides the above, the following are among the most important articles exported during this year, viz.:—

Anchovies	11,967	kegs.
Lobsters, live	861,251	pairs.
Iron	2,840	tons.

Chromate of iron	522 tons.
Chrome salt	284,885 lbs.
Cobalt and zaphers	612,694 „
Copper	992,545 „
Copper ore	128,400 „
Bones	900 tons.
Hones	326,000 pairs.
Lead ore	84,941 lbs.
Carraway seed	4,817 barrels.
Linseed cake	488,014 lbs.
Nickel spies or regulus	499,840 „
Hair	4,513 „
Horn	60,107 „
Potatoes	22,615 barrels.
Buck and goat skins	194,346 lbs.
Calf skins	243,323 „
Lamb skins	4,604 „
Walrus skins	84,287 „
Martin skins	831 pairs.
Otter skins	493 „
Reindeer skins	2,115 „
Seal skins	12,227 „
Fox skins	1,912 „
Wolf skins	,112 „
Ice	13,130 Tons.

The total quantity of corn imported during the seven consecutive years, from 1847 to 1853, will be found as follows, viz.:—

In 1847	1,056,869 barrels, or	503,271	Imperial quarters.
In 1848	1,304,927 „	621,394	„
In 1849	1,437,540 „	684,542	„
In 1850	1,446,256 „	688,693	„
In 1851	1,325,919 „	631,390	„
In 1852	1,264,432 „	602,110	„
In 1853	1,191,104 „	567,192	„

consisting principally of rye, rye-meal, barley, oats, malt, and several kinds of grits. The total annual quantity of wheat imported did not exceed 16,000 quarters, as this does not generally enter into the domestic economy of the people.

The remaining most important articles of import consist in the following goods, viz.:—

Articles Imported in the Years	1850.	1851.	1852.	1853.
Beef, Salted . lbs.	....	635,321	444,461	313,457
Pork, ditto . „	925,445	824,939	840,785	646,825
Cheese . . „	717,494	760,905	868,165	640,361
Butter . . „	2,265,694	2,246,700	2,298,698	1,441,070
Tallow . . „	....	281,842	310,679	195,234
Cotton, Raw . „	1,760,589	2,340,890	2,513,593	2,582,243
Cotton, Twist . „	742,861	560,288	474,490	644,447
Cotton Cloths, Unbleached . „	119,231	63,610	46,496	36,586
Ditto, Manufactured „	428,459	593,546	333,965	385,882
Ditto, Prints . „	....	....	194,581	253,256
Cordage . . „	634,160	569,036	....	566,288
Hemp . . „	3,917,807	5,599,542	2,926,129	4,097,622
Flax . . „	336,319	415,459	728,041	733,970
Ditto, Thread . „	115,922	107,794	130,127	163,726
Ravenduck and Sail-cloth . . „	733,167	808,520	655,145	849,141
Linen Manufacture „	360,542	409,087	295,113	401,428
Silk Thread . „	2,697	2,979	2,973	3,121
Ditto Manufactures „	12,127	12,639	13,086	13,921
Wool . . „	169,745	206,781	184,956	150,420
Woollen Manufactures „	....	....	359,789	376,487
Ditto, Mixed . „	363,798	383,570	116,110	184,915
Ditto, Yarn . „	....	....	24,391	27,073
Skins, Dried . „	526,834	564,360	612,433	435,554
Hides, Raw . „	....	1,231,599	....	....
Leather, Sole . „	239,570	206,372	236,134	96,599
Glass . . „	376,890	552,988	533,436	476,272
Coffee . . „	6,947,304	8,696,392	8,009,024	9,068,600
Sugar, Raw. . „	4,180,730	7,076,669	6,571,578	10,708,019
Ditto, Refined . „	3,580,847	3,360,491	2,382,251	1,852,195
Molasses . . „	234,848	1,864,040	2,201,510	1,029,949
Tea . . . „	89,688	95,957	81,536	85,976
Tobacco . . „	3,024,688	2,525,996	3,730,845	3,214,127
Ditto, Manufactured „	26,826	43,285	37,214	46,495
Rice . . . „	1,504,743	1,504,743	1,470,622	1,262,080
Logwood . . „	748,239	629,768	777,637	594,269
Brandy . . „	885,292	1,007,207	845,043	859,829
Wine . . „	2,013,902	2,013,902	2,273,390	2,096,361
Raisins . . „	294,294	294,294	361,721	240,441
Salt . . Barrels	518,855	51,346	457,372	478,800
Earthenware . lbs.	753,485	830,018	748,239	1,204,823
Iron Goods, Polished „	465,094	455,639	89,231	4,367
Ditto, Cast and Wrought . „	9,218,168	10,158,528	13,837,607	11,523,122
Ditto Nails . „	859,602	1,188,344	1,014,981	688,988
Ditto Fish-hooks . „	15,026	12,216	11,706	14,106
Pewter Wares . „	15,336	15,336	10,128	23,123
Ditto. . . „	10,012	10,012	7,102	20,710
Lead, Pigs . „	77,949	105,631	152,418	84,961
Ditto, Sheet . „	38,086	55,757	27,500	40,889
Ditto, Pipes . „	11,330	2,614	10,782	7,760

Articles Imported in the Years		1850.	1851.	1852.	1853.
Lead, Black	„	20,774	17,990	17,507	18,731
Ditto, Pencils	doz.	18,110	13,960	12,634	17,984
Buttons, various	lbs.	29,317	28,911	22,263	30,730
Ditto, Silk	„	2,697	....	....	2,396
Corks	„	499,031	153,367	553,579	226,843
White Lead	„	445,645	464,367	464,795	368,369
Brass and Copper Wares	„	40,937	59,736	51,249	152,456
Cattle, Live	„	....	....	....	2,199
Paper, Writing } Ditto, Printing }	„	331,427	268,580	365,164	462,328
Tiles	„	3,337,287	2,948,118	2,701,169	2,993,849
Bricks	„	1,115,940	1,167,046	888,186	750,848
Starch	„	67,890	77,039	75,839	64,139
Tin Wares	„	129,362	15,734	....	....
Copper in Bars	„	49,303	30,516	40,625	46,509
Ditto in Sheets	„	1,866	....	....	....
Ditto in Bolts	„	17,442	....	9,747	13,679
Brass Wire	„	13,918	12,525	13,802	12,904
Staves	pieces	13,097,527	10,298,701	11,872,766	10,164,754
Steel	lbs.	184,454	150,581	205,868	187,326
Ditto, Wire	„	110,170	117,322	118,791	172,475

A perceptible decrease has taken place in the quantity of provisions imported, arising partly from the abundant harvest, as well as from the Danish importers having found a more remunerative market in England, facilitated by the North of Europe Steam Navigation Company having opened a direct communication with Slesvig and Jutland, thus enabling them to ship their cattle with ease to Great Britain. In consequence of the establishment of some cotton spinneries and cotton manufactories in the country, the importation of twist and unbleached cotton cloths has decreased. On the other hand, a considerable increase has taken place in the finer kinds of printed goods, as well as in the finer kinds of cotton cloths, in spite of the high duty these articles have been subject to.

We may now reasonably expect that the reduction of duty, sanctioned by the late storthing, and which came into operation on the 1st July, 1854, on the finer kinds of cloths —a reduction from 40 skillings per pound weight to 36 skil-

lings, and from 32 skillings to 25 skillings, and on the unbleached kinds from 16 skillings to 10 skillings—will encourage the more general use of these goods.

The consumption of colonial produce has progressively increased, which may be assumed as a sure indication of the general prosperity of the country.

In 1835, the quantity of sugar imported amounted to 2,808,300 lbs., in 1844 to 6,534,000 lbs., in 1851 to 10,336,700 lbs., and in 1853 to 12,559,800 lbs. Of this amount, however, it must be observed that 800,230 lbs. were re-exported in a refined shape. With all this, it will be seen that the consumption since 1835 shows, during eighteen years, an increase of no less than 232 per cent.; at the same time, the consumption of coffee has increased in a still greater ratio, being no less than 276 per cent.

The consumption of tobacco during the same period has increased 57 per cent.; and tea 32 per cent.

The importation of wine, during the eighteen years from 1835, has increased 49 per cent.; brandy, on the contrary, has remained stationary. On the whole, the consumption of the latter article has sensibly decreased during the last fifteen years; prior to that period, the annual production of spirits in the country was estimated at 20,000,000 quarts: now it scarcely reaches half that quantity.

The amount of coals imported has increased in an extraordinary degree.

In 1841	the quantity	imported	did not exceed	20,178 tons.
In 1847	„	„	was	35,561 „
In 1850	„	„	„	49,691 „
In 1851	„	„	„	54,327 „
In 1852	„	„	„	55,156 „
In 1853	„	„	„	61,363 „

The whole from the coal ports in the north of England and Scotland.

In order to show the increase that has taken place in the number of British vessels trading to Norway, during the

last ten years, I subjoin the aggregate returns for that period, viz.:—

Return of British Ships trading to Norway during the Ten Years from 1844 to 1853, both inclusive.

Years.	Number of Vessels.	Tonnage.	Number of Crews.
1844	107	9,852	775
1845	165	13,337	1238
1846	133	10,743	944
1847	138	10,429	974
1848	170	14,748	1230
1849	110	11,048	804
1850	122	13,227	1067
1851	192	22,884	1719
1852	212	25,542	2198
1853	259	37,068	2329

The great increase this table exhibits has taken place since the repeal of our navigation laws, that event, therefore, may be reasonably supposed to have conduced towards this increased intercourse.

No doubt the natural expansion of trade, consequent upon the liberal commercial systems introduced into both countries, together with the general prosperity of the last three years, will have contributed towards it, but it required some extraordinary impulse, beyond that simple natural cause, to create the development this table exhibits; it is, therefore, the more satisfactory, as it proves how premature the fears of a portion of our ship owners have been.

During the year ending the 31st December, 1853, there arrived in Norway 10,121 vessels, forming a total of 952,641 tons, and employing 51,545 men.

And there cleared out, during the same period, 10,464 vessels, with an aggregate tonnage of 1,045,002, and employing 56,142 men.

The following table, being an analysis of Return No. 2, shows the nationality of the vessels trading to Norway during the year 1853:—

Nation.	Arrived.		Departed.	
	No. of Vessels.	Tonnage.	No. of Vessels.	Tonnage.
British	247	36,078	266	35,310
Norwegian	6,375	688,839	6,725	781,543
Swedish	514	33,998	524	35,366
Russian	529	17,518	516	17,890
Prussian	22	2,080	17	2,092
Mecklenburg	6	1,060	7	1,212
Lubeck	6	1,074	9	1,811
Danish	1,126	49,911	1,121	49,028
Hamburg	10	1,055	9	796
Bremen	15	990	12	652
Oldenburg	41	3,159	44	3,214
Hanoverian	355	21,593	357	21,728
Dutch	582	63,451	584	63,179
Belgian	7	716	7	716
French	146	17,614	145	17,419
Spanish	117	12,352	118	12,493
Neapolitan	3	553	3	553
Total	10,121	952,641	10,464	1,045,002

The total arrivals and departures, during the year, with cargoes, consisted of seventy-two per cent. of Norwegian and twenty-eight per cent. of foreign.

The following table exhibits the progressive growth of the commercial marine of Norway.

Norway possessed in—

Years.	Number of Vessels.	Tons.	Number of Crews.
1806	1,650	194,542	
1835	2,272	196,193	
1845	4,061	321,653	18,705
1850	4,287	378,302	20,956
1851	4,496	412,437	24,057
1852	4,742	427,234	25,388
1853	4,893	454,856	26,545

The commercial marine of Norway, therefore, during the eighteen years from 1835 to 1853, has more than doubled itself; in the eight years from 1845 to 1853, it has increased by 133,203 tons, or by forty-one per cent., and during the three years from 1850 to 1853, by 76,554 tons, or twenty per cent.; the increase in 1853 amounted to 27,622 tons., or six and a-half per cent. From the above it will be observed that at the end of 1853 the commercial marine of Norway consisted of 4,893 vessels, amounting in the aggregate to 454,856 tons, and employing 26,545 seamen. It is a singular fact, that Norway, with only one-and-a-half millions of inhabitants, stands the fourth in the scale of maritime nations; this will be better illustrated by the following comparative table:—

Nation.		Vessels.	Tons.
Great Britain and Colonies possessed in	1850	34,281	4,232,962
United States	1851	....	3,772,439
France	1850	14,354	688,130
Norway	1853	4,893	454,856
Holland	1850	1,793	390,910
Spain and Colonies	1850	7,606	361,401
Greece	1850	3,970	264,981
Prussia	1849	1,531	265,320
Austria	1849	6,083	259,583
Russia (Finland excepted)	1849	1,512	251,000
Sweden	1853	2,826	249,440
Denmark	1852	4,701	245,947
Two Sicilies	1850	10,368	221,749
Finland	1849	1,375	159,379
Sardinia	1850	3,467	159,263
Hamburg	1853	408	123,882

Further, if you compare this branch with other industrial branches and properties in the country, it assumes a still higher relative rank, as no other country can exhibit such an efficient and powerful commercial marine as Norway, compared to its population.

Great fears were entertained, and much was said at the time, about the cheapness of Norwegian vessels, and the low cost at which they were navigated; that our ships never could compete with them; consequently, if the repeal of the navigation laws was carried into effect our shipowners would be ruined, &c.; how premature these fears have been a simple reference to the returns will satisfactorily prove; it will be found that while Norwegian shipping has only been progressing in proportion with other industrial branches in the country, and in proportion with the continually increasing prosperity of the country, our shipping intercourse with Norway since the repeal has nearly trebled itself.

The effect of that Act has tended to equalize the cost of building of ships, and the rate of seamen's wages: much has been said, and deservedly so, of the efficiency of the Norwegian seaman; and his attachment to his home, it was presumed, would enable Norwegian vessels to compete successfully in the longer voyages, as they would not be exposed, as British ships are, to the desertion of their crews.

Whatever may be the voluntary patriotism of seamen, experience has lately proved, that there is no more power to constrain a Norwegian, than there is a British sailor; their allegiance has been found to sit as lightly, and like the British seaman, he does not hesitate seeking employment where he is best paid; the consequence is, that Norwegian vessels, employed in the longer voyage, have to pay their seamen the same rate of wages as the British and Americans are liable to. But the equalization of wages, which the repeal of the navigation laws has effected, is not confined solely to the longer voyages; the home trade is equally affected by it, not only in the increased rate of wages, and cost of provisions, but in ship-building itself. Thus it has removed the only serious contingency the British shipowner had to encounter in his competition with the Norwegian.

PRUSSIAN COMMERCIAL UNION (LEIPZIG).

Report of Mr. Consul Ward on the Leipzig Midsummer Wool Fair in 1855, with Notices of some other German Wool Fairs.

The Leipzig fair, which is an old established one, though ranking only among the smaller German wool markets, was held on the 13th and 14th of June. It was pretty numerously attended by German purchasers, as well as some from Belgium, but none came from England or from America. The prices ranged from 20½ to 23 dollars per stone* for superfine wools, and for middling fine at about 17½ dollars per stone, which prices are an advance of, on the average, 2½ dollars per stone upon last year's prices, and for the best washed wools of 3 dollars per stone and upwards. The prices consequently nearly assimilate to those of the year 1853, and stand now pretty much as they did before the reduction of the export duty from 6*s.* to 1*s.* per centner. The cloth manufacturers will feel of course the effect of the rise, and the spinneries for woollen and worsted yarn, of which there are many in this neighbourhood, lose the advantages they were deriving from the last year's depression of the raw material.

The quantity of wool brought to market at Leipzig was 24,845 stone, being 4,137 stone less than the quantity of last year. The sales went rapidly, but 1,174 centners remained unsold, having come in just as the fair was concluding. The washing of the wool was in general satisfactory.

At *Breslau*, according to the report published by the Chamber of Commerce of that city, the rise of prices appears to have been comparatively greater. Breslau is the largest of the wool fairs except Berlin, and, falling the earliest, usually gives the rule of price to the subsequent fairs. The rise at Breslau was from 15 to 18 dollars per

* 1 stone of 22 lbs. = 22½ lbs. Avoirdupois.—5 stone = 1 trade centner of 110 lbs., or 113 lbs. Avoirdupois.—1 dollar = 3*s.* sterling.

centner (which is there the measure of quantity,) compared with last year, and in some cases more.

Silesian electoral clip fetched 130 to 150 dollars per centner.			
Superfine Silesian	115 to 125	„	„
Fine ditto	105 to 112	„	„
Middling fine ditto	90 to 100	„	„
Inferior ditto	85 to 88	„	„
Second clip	76 to 86	„	„
Fine and superfine dead wool	70 to 90	„	„
Moist and tanners' wool	58 to 78	„	„
Posen, fine clip	88 to 100	„	„
Ditto, middling fine	78 to 85	„	„

The quantity of wool brought to market at Berlin was 44,000 centners, being 11,000 centners less than in 1854.

At the *Weimar* fair about 22,000 stone were sold, besides 13,000 stone not weighed at market. The prices of middling fine wools ranged from 12 to 16½ dollars per stone, being from 2 to 2½ dollars more than last year.

At *Gera* only 6000 stone were brought to market, being 3000 stone less than last year, owing to a considerable mortality which has lately prevailed among the sheep. The prices of combing wool reached 15 dollars, and of fine clothing wools 16 dollars per stone, being an advance of 2 to 3 dollars upon last year.

At *Dessau* the quantity at market was 5,100 stone, about 500 stone less than last year, and the prices from 2 to 3 dollars per stone higher. Several large wool holders were said to have sold before the commencement of the fair.

At *Gotha* 1,895 centners, or 9,475 stone were brought to market. The better sorts of wool, which however did not go beyond the mark of middling fair, fetched from 13 to 16½ dollars per stone.

At *Dresden* about 12,000 stone were sold, at prices of from 2 to 3 dollars per stone higher than last year.

Fine wools fetched from 20 to 23 dollars per stone.			
Middling fine ditto	17 to 19	„	„
Ordinary ditto	15 to 17	„	„

The *Berlin* fair was held on the 18th of June and following days. The quantity of wool at market was very large, having amounted to 100,000 centners, (including 5000 centners from last year's stock,) which is 17,000 centners more than the supply at the last fair. The business began briskly, and good and well washed lots realized an advance of 8 to 12 dollars per centner upon the former prices. The market afterwards fell, and after the best washed lots had gone, the wool in inferior condition could not obtain an advance of more than 5 to 10 dollars per centner. The prices are reported as follows:

Superfine wools from.....	100	to 105	dollars per centner.	
Fine ditto	90	to 95	„	„
Middling fine ditto	80	to 85	„	„
Middling ditto	70	to 78	„	„
Inferior ditto	58	to 68	„	„
Fleece and moist ditto	54	to 56	„	„
Locks ditto	52	to 70	„	„

which are for the most part lower than the Breslau prices.

A considerable quantity of wool remained unsold at the close of the fair. The chief purchasers were Germans. The purchases made on English account were inconsiderable; those on French account were proportionately somewhat larger. The growers were, upon the whole, rather disappointed at the results of this fair, though they actually obtained so much more than last year.

The quality of wool depends so much upon the washing, that the German farmers have of late years found it necessary to pay more attention to that operation than they formerly did. They always bring the wool washed, but further cleansing is usually necessary, in order to free the wool from the sweat, and a final cleansing is even after that often requisite.

Upon a review of the average prices of wool in Germany for many years back, it appears that the superfine and fine wools have, for the most part, become cheaper, whilst the

middling and ordinary qualities have become dearer. An excellent year for the wool growers within the Zollverein was 1845, when the prices were higher than they had been since 1836; and since 1845 prices have not been so high as in 1853, and in the present year. The importation of Australian wool increases, and yet the rising prices of ordinary wool in Germany would seem to show that the Australian competition has not hitherto been seriously felt.

The principal wool fairs in North Germany are, as already mentioned, Berlin and Breslau. These two fairs, with nine other smaller ones, make eleven wool fairs held within the Prussian monarchy; and, according to the official acounts, the quantity of wool actually sold at these eleven fairs was in the year

		Value.	
	Centners.	Dollars.	£.
1853	178,866	14,560,622	2,184,093
1854	167,379	12,317,519	1,847,627

The quantity sold at the non-Prussian wool fairs is not officially published.

The consumption of wool is estimated for the Zollverein at 1·6 per head, and for Austria at 1·5 per head of the population.

PRUSSIAN COMMERCIAL UNION (LEIPZIG).

Report of Mr. Consul Ward, on the Leipzig Easter or Jubilate Fair of 1855.

This Fair began on the 22nd of April, and lasted for the usual period of three weeks. The hopes which the merchants formed of it were not sanguine, considering the political uncertainty of the war, and its possible extension to Germany, the stagnation of trade in America, and the high prices of the necessaries of life in the central parts of Europe. But the business transacted exceeded the expectation formed, many customers continued to make their purchases as in past years, and a real demand for many important articles showed itself. The Greek buyers were numerous, and it was evident that the money which foreign armies had put into circulation in the Danubian Provinces was finding its way to Leipzig, and giving rise to brisk sales of manufactured goods. The effect upon silks, as well as upon English cotton manufactures, was very favourable.

The staple articles at the Leipzig fairs have for some years past been woollen cloth and leather. Foreign manufactures have ceased to play an important part here, either for home consumption or exportation, and the fairs are now chiefly marts for German productions. They have, in fact, changed their character so materially, that their utility is now doubted by many; and they would probably have dwindled away, if it were not for the great force of habit among commercial men, who continue to buy and sell, and make payments, at certain accustomed periods of the year, although every article of trade is now to be had at whatever time it may be wanted; and the Leipzig warehouses keep

adequate stocks during the whole year to supply the public demand, without reference to the falling of the fairs.

Of woollen cloths, buckskins, and fancy stuffs, there was a large assortment, though the quantity fell short of what had been brought to market on previous occasions. The high price of wool had operated to prevent many manufacturers from working to their usual extent. Purchasers appeared from the Levant, from Switzerland (which had failed on several late occasions), from America, from Italy, and from various parts of Germany. The entire quantity of cloth, buckskins, &c., brought to market was 250,000 pieces,* of which about three-fourths were sold, and large orders were given to the manufacturers for particular cloths, to be furnished during the summer. Those, however, who manufactured cloth exclusively for the American market, such as the three-quarters cloth of Semmerfeld, were upon the whole disappointed. But the cloths of Finsterwalde, Forsk, Grossenhain, Bischofswerda, and many other Saxon and Prussian towns, lying within a radius of fifty English miles from Leipzig, were well sold, and in considerable quantities. The prices ranged, for piece cloths from 1 to 2 dollars higher than at the Michaelmas fair; cloths sold by the ell fetched 2½ groschen more, and new buckskins and fancy stuffs from 2½ to 4 groschen more per ell. But this rise of price was in no proportion to that of wool,† a circumstance which naturally makes the cloth manufacturers anxious as regards the future. Flannels for the East have been in great demand in Germany since Christmas. Some stimulus has been also given to the Saxon clothiers by the circumstance of large orders for military clothing having lately been received on account of the French Government.

* Of Saxon cloth 4 to 5 pieces, and of Netherlands cloth 3 to 4 pieces, go to the trade centner of lbs. 110 = lbs. 113 avoirdupois; the Saxon dollar containing 30 groschen = 3*s*.

† About 7,000 centners of wool, of which 1,000 centners were Australian, were sold at this fair at an advance of 4 to 5 dollars per centner above the Michaelmas prices. The regular wool fair does not take place till the middle of June.

The *Merinos and Thibets* of Gera and Greiz changed hands to a large amount, but did not realize an increase of price. Among the Saxon fabrics, the so-called *poil de chevre* attracted much attention, and the whole stock was sold. Cashmires and other fancy stuffs were flat; the first more especially; and one cause was probably that so-called Cashmires are now often made entirely of cotton, retaining nothing of their woollen origin but the name.

The *fancy stuffs* of mixed woollen and silk, which are fabricated at Chemnitz with a high degree of excellence, went off well where the designs were new, but the old patterns hung on hand.

The *furniture stuffs* of Chemnitz, and the damasks of cotton or wool, or mixed, are exported to a large amount, but the demand for them on this occasion was not very brisk.

German calicoes and the *white wares* of the Voigtland went briskly, with little alteration of price since the last fair.

Cotton hosiery was unusually depressed, owing chiefly to the late stagnation in the American markets. Although the English roundabouts, as well as the French circular looms, have been introduced at Chemnitz and elsewhere, doubts are entertained whether the export trade in German hosiery will be a permanently profitable one. The vent is indeed large, but the profit disproportionally small. Of the value it has been estimated that 85 per cent. consists of the material, whilst only 15 per cent. remains for freight, wages, other expenses, and profit, a state of things not calculated to encourage the manufacturer.

English cotton manufactures were in much better demand than was expected, and the same was the case at the Brunswick Candlemas fair, where English goods are understood to have gone particularly well. The Greeks from Moldavia and Wallachia, as well as the Poles, bought at Leipzig pretty largely, and the vendors (a rare occurrence) were not dissatisfied. It should, however, be borne in mind, that this branch of trade, has, from unavoidable circumstances, been greatly narrowed, and that the entire quantity of British cotton

stuffs imported into Leipsig in the year, whether for consumption or exportation, now seldom reaches 10,000 centners.

Silk stuffs, chiefly French, and *ribbons*, were pretty much sought for, and considering the unfavourable state of the times for articles of luxury, the holders had every reason to be content with the result of the fair.

The *fur* business began briskly, in consequence of the large purchases by the merchants from the East. Some articles of peltry were considered too dear, but the dealings in German furs were very animated, and rock-martens, free-martens, foxes, and cats, were in great demand; otters and hares were rather flatter. Of Prussian furs there were few arrived in time for the fair,* but further supplies were expected. In *raw hides* the fair was unimportant. This article is in great demand in the seaports, where the prices are high, and the stocks small. Buenos Ayres hides fetched 30 to 33 dollars, and Porto Cabello 27 to 28 dollars per centner. Several other sorts of hides did not appear. East India kip skins were brought in large quantities, and the fine and middling sorts wese especially in demand, and fetched 2 dollars per centner more than at the last fair. The supply of German neats' hides was but small. Saxon neats' hides fetched from 23 to 25 dollars, Prussian and Hanoverian from 20 to 24 dollars per centner. Calf skins in good demand; those of 3 to 4 lbs. weight fetched 11½ to 12 groschen the lb.; those of 1⅓ to 2½ lbs. weight, fetched 12 to 14 groschen.

Leather has generally fallen in price since Michaelmas; some few sorts have remained the same, but none have risen since that date, and there is consequently a disproportion between the price of raw hides and that of the manufactured article. Some complaints were made of the insufficient dry-

* At the close of the fair, a further supply from Prussia, in fact, arrived, and went off briskly. Badgers' furs were bought chiefly on French account, ermines and colinsky furs on English, and coloured Astracan furs on German account.

ing, as well as quality, of the leather brought to market. Sole leather fell 2 dollars per centner in price. Good heavy leather fetched 38 to 40 dollars; that of middling strength 34 to 36 dollars; German cow leather 33 to 37 dollars; wild ditto 30 to 32 dollars per centner. Of upper leather the stock was all sold at the following prices:—brown neats' leather, 10½ to 12½ groschen; kips leather, according to quality, 7½ to 11½ groschen; brown calf 17½ to 20 groschen per pound; black and white sheep leather, as before; tanned brown horse leather fetched 30 to 40 dollars per dicker; black and brown polished leather unchanged. The Leipzig leather market has gradually risen in importance, and is now one of the first in Germany.

The transactions in *linen* were not very brilliant. The German linen manufacturer has yet much progress to make before it can successfully compete with that of Ireland in foreign markets. Both the bleaching and dressing of plain German linens are inferior to the Irish. For figured linens there was more demand. The linen and half-linen figured drills for trousers, &c., manufactured in Saxony and in Austria, are highly esteemed, and both in quality and design are fully equal to the drills produced in England, France, and Belgium. At Zittau, in Saxony, this branch of industry is very flourishing, and at least 100,000 pieces are annually produced.

The Saxon damasks were not much sought for, but as regards their quality and beauty they continue to maintain their character, and are scarcely surpassed by any foreign fabrics.

Waxed or oil cloth, though not properly an article comprised under the fair transactions, is manufactured at Leipzig to a greater extent perhaps than at any other place in Germany. The business is a flourishing one, and in the designs for floorings, table-covers, &c. much improvement has of late years been visible.

A kind of *Sarsenet,* called bookbinders' linen, is also made here in considerable quantities, and finds vent both in and and out of the fairs, the quality being good and the price moderate.

Money was tolerably plentiful during the fair, and bills were easily discounted at 4 per cent. A good deal of excitement has been caused by a law lately passed by the Prussian legislature, prohibiting the circulation within the Prussian monarchy, after the 1st of January, 1856, of any paper-money issued in other States in notes of less value than 10 dollars each. This measure throws out of circulation the paper-money of Saxony, Hanover, Hesse, the Thuringian States, and a number of smaller States, to an amount estimated in the whole at 16 million dollars. Some temporary inconvenience will in consequence arise to the trade of Northern Germany, but the measure is founded upon a right principle, the paper currency of certain petty States having been extended to a dangerous amount. The Anhalt Duchies, for instance, have allowed their issues of notes to reach the extravagant amount of four million dollars.

The trade between Austria and the Zollverein has by no means increased so much as was anticipated in consequence of the Treaty of the 29th of February, 1853. The Austrian regulations with respect to permits are complained of, and the high agio, or difference in value between Austrian paper-money and silver (now 29 per cent.) operates to check importations from the Austrian dominions into the Zollverein.

The Turkish tariff of duties upon the goods of the German Zollverein imported into Turkey expired, according to the Treaty of 1850, on the 1st of March last. The Porte proposed the appointment of Commissioners to prepare a new Tariff, and that in the meantime all exports and imports should be charged with certain provisional *ad valorem* duties. Prussia, however, preferred a temporary prolongation of the existing Tariff, which the Porte agreed to, and the scale of duties fixed in the year 1850 consequently remains in force.

The occupation of the Danubian Principalities by the Austrian forces is considered by the Leipzig merchants a favourable circumstance as far as their interests are concerned, since they have no apprehensions of Austria imped-

ing the commercial relations with Germany. The Leipzig fairs alone, according to the reports of the Prussian consuls in the Principalities and of the statistician Soutzo, supply Moldavia and Wallachia annually with manufactured goods, to the value of above 2,000,000 dollars (a portion of which are English), besides the goods exported thither from Leipzig at other times than during the fairs. The Prussian province of Westphalia also exports largely to the Principalities. It will be easily understood how deeply Germany is interested in preserving this market for her produce and manufactures, which would be capable of great extension in the direction of the Levant, and the countries bordering on the Black Sea, but for the paralyzing influence of Russia upon the commerce of those countries. The recovery of the entire freedom of the navigation of the Danube is of course an object of primary importance to the commercial interests of all the German States.

A new invention of a *gig mill* or *roughing machine*, by Mr. Ernst Gessner, of Aue near Schneeberg, was exhibited during the fair, and excited great interest. It realizes in a high degree what should be the object of every machine, viz., superiority in working power, combined with cheapness. The cloth manufacturers who have tested this machine are unanimous in their approbation of it, and declare that a profit of 70 per cent. is to be realized from the capital invested in its application. The gig-mill is on its way to the Paris Exhibition.

A recent discovery of a new kind of *grease* made from *rapeseed oil* in its raw and fresh state, has been made in Leipzig, and a manufactory established for its production. The mass of grease or fat produced is quite pure, without taste or smell, and, according to medical certificates, contains nothing in the least injurious to health. In cookery it answers fully the purpose of butter, with the advantage that, instead of the usual quantity of butter, one-third in quantity of the rape-seed grease will suffice. The manufactory has hitherto produced only about 10 centners of this grease daily,

but its operations will be gradually extended as the demand increases.

The Leipsig and Dresden Railway continues to prosper, and its traffic to increase The receipts upon passengers and goods in the year 1854 were 1,422,898 dollars, the former being in number 630,504, and the latter in quantity 55,884,296 centners. The dividend paid upon the shares for the past year was at the rate of 6½ per cent. for profit, besides the 4 per cent. interest upon the capital of 6,500,000 dollars, which is about to be increased. The Saxon Government lately made an offer to purchase the whole of the shares, and take the railway into the hands of the Crown, but the offer was rejected by the Company. The 100-dollar shares have risen in the market to about 198 dollars per share.

The Governments of Prussia and Saxony have at last come to an understanding to allow the formation of a branch railway directly from Corbetha, on the Thuringian line, to Leipzig; and the work has already been begun.

A great saving of time will thus be effected between Leipzig and Weissenfels, on the line to Cassel, Frankfort, &c.; and the delay of the present circuitous route by Halle will be avoided.

A new direct line has already been conceded and begun from Leipzig to Wittenberg on the Berlin-Anhalt line, whereby the distance between Berlin and Leipzig will be materially shortened, as both of the existing railways between those places—viz., by Cothen and by Priêsa—take circuitous routes.

The discovery of a considerable field of iron-ore at Hof, on the Bavarian-Saxon frontier, has recently given birth to an association for carrying on extensive iron-works there, which are to be worked with coals brought from Zurckau. The yield of iron from the ore is estimated at 35 per cent.; but what would give complete success to the undertaking is a railway direct from Zurckau to Hof, for the transport of coals.

Saxony is rich both in iron and coal; but they are not

found associated locally as in England, and consequently must be brought together by artificial means.

The production of iron in Saxony increased, within the period 1835 to 1850, from 90,000 to 140,000 centners yearly; but this quantity bears a very small proportion to the quantity consumed in the country. The average consumption of iron per head in the entire Customs Union, in the year 1850, was 21½ pounds, and in Saxony 31½ pounds (or about 600,000 centners), but of the latter only 7½ pounds were raised within the country, the remaining 24 pounds being supplied by importation. The Saxon iron-works, like those of other German states, are susceptible of much improvement in respect of the construction and management of the furnaces, and cannot compete with those of England or Belgium. An instance lately occurred in which iron rails, manufactured in Austria, cost on the spot from 11 to 12 florins per centner, whilst a Liverpool house undertook to deliver rails of Welsh iron at Vienna, free of all charges, at 6 florins per centner. Such instances show how much Germany, as regards iron, is still behind Belgium, where the average consumption is 41 pounds per head, and behind England, where the same was lately estimated at 94 pounds per head. Saxony, in particular, requires more high-blast furnaces, and better means (such as small railways) of supplying the iron-works with coal.

An account lately made up of the business transacted at all the post-offices in the Kingdom of Saxony (of which the central direction is at Leipzig), in the last year, gives the following results:—

Number of ordinary letters and of publications under cross bands	8,120,206
Registered letters	140,969
Packets sent by post	1,283,753
Money letters and packets	910,187
Of which latter value in silver — Dollars	14,705,323
„ in gold	4,340,005
„ in paper money	85,368,144
„ in Government Securities and other valuables	14,426,042

The number of postage-stamps sold for franking letters amounted to 4,899,826.

These results, for a country whose population is scarcely 1,800,000, give evidence of great commercial and literary activity in the way of correspondence, as well as of the success of the groschen system of postage, the normal rate of postage in Saxony being one groschen, or rather more than a penny per letter, with a reduction of one-half upon letters conveyed merely within the limits of towns.

Reverting to the general results of the fair, it was pronounced by competent judges, after its termination, to have been, as regards the wholesale trade, a good average fair. In some minor branches, however, such as hardware, glass, jewellery, &c., the sales are stated not to have reached the average; and among the retailers, many complaints were heard; but it is not possible to ascertain with perfect accuracy the quantity sold of any given article until the fair accounts are made up, which is never done until after the close of the year.

The *Book Fair* succeeded the general fair, as usual. According to the fair-catalogues, the number of publications has somewhat fallen off in the last as compared with the previous year. The number is stated to have been about as follows:—

Books, Maps, and Works of Art.

	Actually published.	Announced as forthcoming.
Half year from Easter to Michaelmas, 1854	4,300	590
Half year from Michaelmas, 1854, to Easter, 1855	4,800	775
	9,100	1,365
Add . . .	1,365	
Total . . .	10,465	

which, however, shows the continuance of much activity in the literary world of Germany.

Leipzig, May 23rd, 1855.

PRUSSIAN COMMERCIAL UNION (MEMEL).

Report on the Trade of Memel, for the year 1854.

It cannot be denied, that the trade of Memel during the year 1854 considerably increased, in consequence of the blockade of the Russian ports; and it would seem to be shown by the statistical reports, that Memel had seldom experienced so prosperous a commercial year. But on a closer examination it will soon be seen, that the bright hopes formed in the spring, with respect to the trade of Memel, soon vanished; for the ordinary trade of Memel has suffered by the almost incredible increase of expense, arising from the extensive transit trade to and from Russia, such as freights, rents, expenses of carriage transport, and labour.

But commission business has by no means produced the benefit which was expected, principally because the localities and offices did not suffice for such extraordinary exigencies, and that consequently at first great sacrifices were inevitable.

These difficulties were further increased by the fire, and the destruction of all the commission offices and store-houses. On the other hand, the labourers were seldom in such constant employment and high pay which enabled them to bear the general dearness of provisions.

With regard to the navigation, it appears that there arrived in 1854, 782 vessels, and about 80,000 lasts more than in 1853, and that there cleared out 608 vessels, with about 50,000 lasts more than in 1853. The freights were high; nevertheless the gains were not so large as in ordinary times, as the expenses of hire and outfit were very high from the commencement of the navigation. The internal navigation reaped an unprecedented large profit. The demand for boats, chiefly for the transit of goods to and from Russia, was so great that, even at incredibly high profits, the demand could not be supplied. For instance, whilst in previous years the freight per boat from Memel to Kowno, on the Russian

frontier, amounted to something about 5 gros. per cwt.; the same in the autumn of 1854 increased to from 60 to 93 gros., which makes almost ten times the whole freight from Memel to England.

It may be considered that the principal advantage held out to Memel by this year's commerce, is a hope that, at the termination of the war, in future ordinary times, many articles of trade which have now been conveyed by necessity to and from Russia *viâ* Memel, will still continue to take the same route; that is, provided Russia will continue to maintain her present liberal system introduced in consequence of the war, and which may be the less to be doubted, inasmuch as it has considerably diminished the smuggling trade.

Reference is here made to the Sound dues, as weighing very heavily on the eastern Russian trade, and a great hope expressed, that if the government cannot obtain their abolition, it will at least procure their diminution.

Complaints are further addressed to the government concerning the want felt of Fire Insurances, and as to its being severely felt by the merchants. A proposal is made, that Foreign Insurance Companies shall be allowed free competition throughout the Prussian states generally, not only for the insurance of goods but of buildings and of moveables. Half of the property at Memel is represented as uninsured, in consequence of refusals of the companies to grant insurance, more especially since the late fire.

Statistics given of transport and exports from Memel of linseed, flax, and hemp, for the years 1853 and 1854.

Exported.	1853.	1854.
Linseed . . .	5,016 lasts. ..	101,363 lasts.
Flax . . .	546,395 stein. ..	2,123,635
Hemp . . .	14,148 ..	1,350,671

Of seed there were exported in 1853, 2,407 tons, and in 1854, 46,620 tons, mostly on account of Russian houses.

SHERBORO' ISLAND, AFRICA (WESTERN COAST).

EXTRACT from the Report of Mr. HANSON, Her Majesty's Consular Agent at Victoria, Sherboro' Island, on the Trade of that place, for the year ending December, 1854.

THE commodities exported from Sherboro' are palm-oil, palm-nuts, rice, camwood, ground-nuts, bennie-seed (but at present in very small quantities), country cloths, ivory, coarse mats, and timber.

The articles imported are Manchester cotton goods of various descriptions, tobacco, salt, guns, crockeryware, gunpowder, iron pots and iron bars, brass neptunes and kettles, swords, machetes, and knives: most of the commodities of import being the produce of the manufactories of the United Kingdom.

The production of palm oil, palm-nut kernels, ground-nuts, and rice, is in my opinion capable of increase to almost any extent, being dependent solely upon the peaceful condition of the country.

It is important to observe that, since about March last, camwood has been so valueless in the market as not to be purchased at any figure; a very material diminution of export, therefore, is to be set down to this fact.

There are no port dues nor tonnage duties, and no duties upon imports, paid in this district of Sherboro'; but the king and chiefs are anxious that some understanding shall be come to on the subject.

At the date of my writing, the market price of palm oil is 2*s.* per gallon; rice, 4*s.* per bushel; palm-nut kernels, 3*s.* per bushel. The very finest samples of camwood will in some instances be bought at 6*l.* per ton; country cloths, 2*s.* each; bennie-seed, 4*s.* 6*d.* per bushel; ground-nuts, 1*s.* 6*d.*; ivory, 4*s.* 2*d.* per pound; coarse mats, 2*s.* each. In the rainy season (from May till the middle of November), however, when rice is scarce, the price invariably rises; and in some seasons it sells as high as 10*s.* per bushel.

About 47,500 gallons of palm-oil purchased here has been, I have learned, shipped to France.

The gross amount of export hence of palm-oil during the past year has been 164,543 gallons, representing 16,454*l.* of value; and 56,350 bushels of rice, worth, at the present market price, 11,270*l.*

1*st January*, 1855.

SARDINIA.

From a report of Mr. Consul Craig on the trade of the island of Sardinia for the year 1853, it appears that—

In 1838, the census gave the population at		.	524,640
In 1843,	„	„	. 543,207
And in 1848,	„	„	. 547,112

Padre Napoli, who published a work on Sardinia in 1814, mentions that then there were only two or three coffee-houses, a very few shops for the sale of serges and woollen drapery, and not one of fancy hardware in Cagliari; now it may be said to superabound in all these, in which good assortments are combined with extensive supplies of a variety of costly and excellent materials.

	Imports.		Exports.
Azuni says, that in the year 1796, the imports and exports were .	2,000,000	..	8,738,445
Count Lamanora, in his *Voyage en Sardaigne*, gives the following average values of the imports and exports for the 10 years from 1827 to 1836 . .	7,996,179	..	7,060,622
Government has published for 1849	6,785,687	..	10,120,014
„ „ 1850	7,615,350	..	10,397,754
„ „ 1851	7,463,200	..	10,739,674
„ „ 1852	9,779,479	..	10,863,247

A fatal experience has shown that the workmen employed upon the roads, being chiefly Italians, can only work with safety from the 1st December to the 31st May; during

he first three months of which period operations are frequently interrupted by stormy weather which then prevails, and especially in the mountainous regions.

At this moment we have three important projects upon the tapis here. The first is the construction of a wet and a dry dock at Cagliari. The second is the establishment of a line of steamers from this to Genoa, to run in opposition to the mail steamers, whose fares and freights are considered too high. The third is the formation of a bank of deposit, discount, and circulation, at Cagliari, to be called "Banca Sarda," which has been sanctioned by a royal decree, dated 9th ultimo.

Value of exports of national produce from the island of Sardinia to the Sardinian Continental States for 1853, 16,430,656 francs.

Value of imports of national produce from the Sardinian Continental States into the island of Sardinia, for 1853, 4,553,286 francs.

Value of exports of foreign produce, which had paid duty, from the island of Sardinia to the Continental States of Sardinia, for 1853, 14,341 francs.

Value of imports of foreign produce, which had paid duty from the continental states of Sardinia into the island, for 1853, 573,347 francs.

The amount of export duties for 1853, was 28,815 francs.

The amount of import duties for 1853 was 1,019,335 francs.

Roads.

	Kilometres.
Total extent of road remaining to be executed in 1850, to complete the proposed network throughout the Island .	460
Total extent in actual progress of execution . . .	187
Total extent yet uncommenced . . .	273

Of the 187 kilometres in actual progress of execution, there are at present 120 kilometres practicable for carriages.

22nd December, 1854.

SPAIN (BARCELONA).

Abstract of Report of Mr. Consul Baker, on the Trade of Barcelona for the year 1854.

There was a decrease in the amount of British shipping at this port during the year 1854, as compared with the preceding year, of 63 vessels, a decrease of tonnage of upwards of 20,000 tons, and of more than 40,000*l.* in the value of the cargoes.

Notwithstanding, however, that a reduction, by no means unimportant, has taken place in the amount of the chief article of import from Great Britain, the decline in the number and tonnage of British shipping, trading at the port of Barcelona, is chiefly attributable to the active part taken by foreign flags in the carrying trade of British produce, from British ports.

From returns on this head, it appears that whilst, in 1853, only 64 French vessels, having an aggregate tonnage of 11,570 tons, entered this port; in 1854 they amounted to 118, with a total tonnage of 12,732 tons. Out of the number of vessels in the latter year, it appears that no less than 66 came from English ports with 9,932 tons of coals, this being the first instance of the importation into this port of English coals in French vessels, their transactions having previously been confined to the importation of French produce alone.

In 1853, 53 Swedish and Norwegian vessels, having a tonnage of 12,660 tons, entered the port, whilst in 1854 these figures rose to 78 vessels and 19,260 tons; out of this no less than 43 vessels came from British ports, with 11,400 tons of English coal.

Out of 23 Prussian vessels 21 came from Newcastle, Cardiff, and Newport, bringing 8,800 tons of coal, coke, &c., the remaining two coming from Liverpool with machi-

nery. From the last port there also arrived five Hanoverian vessels, with 1,200 tons of coals, &c.

The Dutch vessels trading at the port of Barcelona, were double in 1854 the number of the foregoing year. Out of 19 of these vessels, 13 came from Newcastle, Cardiff, and Newport, carrying 2,670 tons of coal, another having cleared from Liverpool with a valuable cargo of machinery. Seven Mecklenburgh and Oldenburgh vessels arrived at this port during 1854, all from England, and having a cargo of 2,000 tons of coal and iron, &c. Sixteen vessels, under the Danish flag, also entered the port, seven of them coming from England with cargoes similar to the last mentioned. Of eight Portuguese vessels 3 came from Cardiff with 780 tons of coal, and 2 Neapolitan and 2 Sardinian vessels arrived with coal from British ports, whilst 1 American barque entered with rails from Liverpool.

It thus appears there has been a great preference given in 1854 to foreign vessels, for the conveyance to this port of British produce, probably arising from lower rates of freight. Out of 366 foreign vessels other than British, no less than half the number brought British produce and manufacture, chiefly, coal, coke, rails, iron, and fire-bricks. The imports in British bottoms were mostly articles of a similar nature, coals being the staple article. It is worthy of remark that coals, in small quantities, have also been brought to Barcelona from Gijon and the Asturian mines, as well as two or three cargoes from Cette and Portvendres; there is however but little competition to be anticipated from these sources.

Political events and Asiatic cholera considerably affected the district in the months of August and September; and the depression of trade arising from want of confidence, and other causes, continued until the end of the year.

Railways, the materials for which form a large branch of British importations, were very much retarded during the year, and works which had been previously confidently spoken of were abandoned.

Portions of the Martorell line and that of Granollers, or

the north line, were opened during the year; of the former about one half its proposed length; neither, however, call for particular remark at present, the first not being completed, and the second depending upon the continuation of the line to San Juan de las Abedesas, where the coal fields are situated, or to Gerona, and eventually to Figueras, where it might join the Perpignan branch of the French railways.

Much of the success of the first plan would depend considerably upon the proper working and produce of the coal mines. The second plan would, it is considered, be the more important, as bringing the district of Barcelona, and the adjoining country, within a short distance of the south of France; and it would, without doubt, with proper management, prove a profitable and successful enterprise.

The cotton-mills have not been so advantageous during the year as was anticipated; this arose principally from the differences between the employers and the workmen in the early part of the year, and from the suspension of business in the autumn months.

Although, however, there have been no new mills established, nor any large increase in the business of those already in operation, yet it is now supposed, that at present all the mills are fairly at work, the demand for their produce, for the Spanish market, being considerable: unfortunately, however, it is to be feared differences will soon again arise between the employers and the operatives.

During the last three months and a half, there was a marked increase in Spanish shipping, due for the most part to the great demand in France for Spanish wines, and the highly remunerative prices obtained. The town and province of Tarragona have derived the greatest advantages from the trade.

January 25, 1855.

SPAIN (BILBAO).

Abstract of Report from Mr. Consul Brackenbury, on the Trade of Bilbao during 1854.

The Basque Provinces of Biscay, Guipuzcoa, and Alava, are governed by laws peculiar to themselves, the Queen of Spain being acknowledged by them under the title of Señora.

These provinces enjoy also, amongst other privileges, that of having each a local government, which is carried on by a provincial deputation, the Assembly being held yearly at Guernica for Biscay, at Vittoria for Alava, and at such town as may be appointed for Guipuzcoa, the Civil Governor presiding under the title of Corregidor. These Assemblies consist of two classes, the Padres de Provincia, or elders, who, having filled the office of Deputy for two years, are entitled to a seat for life; and the Deputies, who are chosen by the electors for the various districts.

At the meetings of these bodies, the interests of the provinces are discussed, all financial and other matters connected therewith examined into, and a committee appointed to watch over and protect their interests in the Congress, and to report thereupon to the Provincial Deputation.

Other privileges enjoyed by these provinces are, freedom from all government taxes, exemption from the conscription to the army, the liberty of importing, free of duty, tobacco and salt, and exemption from using stamped paper, which is obligatory elsewhere throughout the kingdom.

Previously to 1841, there was a perfect freedom of trade in these provinces, and there consequently existed a very large trade between the port of Bilbao and Great Britain, consisting principally of cotton goods, hardware, cutlery, and earthenware—certain port and local dues being only levied. In 1841, however, the Government at Madrid established

a custom-house at Bilbao, a measure which effectually put a stop to the large trade between that port and Great Britain.

Codfish is one of the chief articles of import into Bilbao, from whence the towns and villages of the Basque Provinces, and those of Old and New Castile and Aragon, are supplied with this commodity.

In 1825, the larger portion of the codfish imported into Bilbao came from Newfoundland in British bottoms; since that period, however, the Norwegian codfish has gained the ascendancy, and is now imported to a much greater extent than that from Newfoundland. In 1854, the importation of this article in British bottoms had entirely ceased. This effect can only be attributed to the heavy differential duty of 20 per cent. on codfish imported under a foreign flag.

The following figures will show the relative position of this trade in 1825 and 1854 respectively.

In 1825, 78,719 cwts. of Newfoundland codfish were imported into Bilbao; of this amount, 46,022 cwts. were imported in British bottoms, and 1,026 in Spanish bottoms, making the total imports of Newfoundland fish for that year, 47,048 cwts. In the same year there were 26,642 cwts. o Norwegian, and 5,029 of Iceland codfish, making a total of 31,671 cwts. imported under Norwegian and Danish flag respectively.

In 1854, 10,430 cwts. only of Newfoundland codfish were imported into Bilbao, the whole being brought in Spanish bottoms, as also were 5,045 cwts. of Scotch fish; whilst the importation of Norwegian codfish in Spanish bottoms had risen to 94,177 cwts.—28 cwts. only being imported under the Norwegian flag.

Of the Iceland codfish, the imports of which amounted to 4,026 cwts., 1,878 cwts. were imported in Spanish, and 2,148 cwts. in Danish bottoms.

This increased demand for the Norwegian fish is attributed to its coming into the market at a much earlier period, and to its being of a larger size, although inferior in quality, to that brought from Newfoundland.

The Scotch ling is very highly prized in the Bilbao market.

Cotton Tariff.—The importation of cotton goods being limited to those of twenty-six threads to the quarter of the Spanish inch, has naturally a most injurious effect, as well on the Spanish exchequer as on the just and honourable trader, by the large contraband trade that such restrictions naturally give rise to. This contraband trade appears to have assumed a most systematic form, insurances being, it is stated, regularly effected to cover the risk of seizure, &c.

To instance the restrictive character of the duties upon cotton goods, cotton shirtings are charged at a rate of duty equal to nearly 39 per cent.; whilst printed cotton handkerchiefs pay a duty amounting to upwards of 48 per cent. The duties on velveteens and fustians, articles of large consumption among the working classes of the country, are also most excessive, the rate of duty on the first-named article being upwards of 75 per cent. In addition to the above duties, there is an average differential duty of 20 per cent. on any of these or any other articles imported in foreign bottoms, and this additional duty may be said almost to close the import trade against British vessels. Duties such as these are naturally alike injurious to trade and the Spanish revenue. Under their operation, legitimate trade is almost extinguished by unequal competition with the contraband article. It would be necessary, in order to afford any real relief, that the duties on plain dyed and printed cotton goods and velveteens should be greatly reduced, and that goods of fourteen threads to the inch should be admitted.

Linens.—The above remarks equally apply to the duties on linens, many of the coarser descriptions being entirely excluded, whilst the duties upon other descriptions are nearly prohibitory, with a view to protect the native manufactures, which are extensive. On such descriptions as are allowed to be imported (chiefly Irish linens), the duties are from 30 to 40 per cent. Linen yarns are largely imported, the

duties varying from 8 to 30 per cent., the coarser qualities being the most heavily rated. The object of such a system with reference to this article, it is difficult to understand, as there are no flax spinning-mills in the country, and consequently no native interest of this character to protect.

The importation of silk manufactures from Great Britain is chiefly confined to India silk and spun-silk handkerchiefs. French ribbons and Lyons manufactures are imported to a considerable extent. All other demands for articles of silk manufacture are supplied from the looms of Barcelona, Valencia, and Seville.

Coarse woollen and stuff goods were formerly imported to a considerable extent into the Basque Provinces; and notwithstanding the excessive duty (in some instances amounting to nearly 120 per cent.), they are still in demand from their great superiority to the native fabrics, and being too bulky an article for smuggling, moderate importations are still occasionally made.

The finer descriptions of woollen goods are almost wholly imported from Great Britain and France, the duties on these goods varying from 40 to 80 per cent.

The duties on woollen manufactures should not, for the benefit of the trade, be higher than 30 per cent. on coarse goods, and 20 per cent. in respect of the finer descriptions.

The duties on pig iron and iron goods range from 30 to 110 per cent.; those on hoop, sheet-iron, and iron wire having been raised in 1852.

Iron ore, which abounds in the mountains surrounding Bilbao, gives considerable employment to native industry, and is exported to a large extent to France. This branch of industry commenced in 1850, and was prospering materially, English vessels being employed to convey cargoes of this ore to England. In March, 1852, however, the Spanish Government imposed an export duty on this article, and a differential duty on such of it as was carried in English bottoms; this at once stopped this trade with England.

The ore in question is used in the iron manufactories of Biscay, and to a large extent in an iron foundry adjoining Bilbao.

Copper ore also is found in the province of Biscay, and mines of it are now working, the ore being shipped to Swansea for smelting.

Ship-building is carried on at Bilbao to a large and increasing extent, there being four yards for this purpose on the banks of the river Narvion. The construction of these vessels is mostly good, insurances being effected on several of them at Lloyd's as A 1. The wood used in building them comes from the forests of the Basque Provinces. Many of the vessels built in these yards cannot trade with Bilbao, on account of their draft of water and the shallowness of the river at the bar. These vessels are at once equipped, leave in ballast, and only return for repairs.

There are also on the banks of the river, paper manufactories and tanneries, likewise mills, where the corn is ground for the consumption of the province and for exportation, which is carried on to a considerable extent, chiefly to England, France, Cuba, and Porto Rico.

The wheat is principally brought from Castile, and mostly shipped for exportation from Bilbao and Santander.

Tobacco, English yarns and hardware, French silks, ribbons, and porcelain, and French and German hardware; deals from Norway and Sweden; sugar, coffee, and cocoa, from Havannah and ports in South America; and cinnamon imported through British ports, form the staple imports of Bilbao.

The amount of duties derived by the State from the custom-house at Bilbao averages about 160,000*l.* a-year. The population of the united provinces, Biscay, Guipuzcoa, and Alava, is estimated at 318,000, distributed as follows:—

Biscay	120,000
Guipuzcoa	118,000
Alava	80,000

There is in the town of Bilbao a well-directed college,

and several charitable institutions, these latter being supported by the municipality and private subscriptions. The country around is highly cultivated, the produce being, however, consumed by the population of the district. The chief articles of produce are wine, maize, and kidney beans. This year, however, the yield of wine has failed from the vine disease. Very large purchases of red wine have been made in Aragon and Castile by the French Government, the import duty on foreign wines imported into France having been remitted.

SWEDEN.

EXTRACT from the Report of Mr. Consul PRINGLE, on the introduction of a new system of Weights and Measures into Sweden.

A NEW system of weights and measures has been published by His Majesty the King of Sweden, and which system is to come into operation on the 1st of January, 1856.

His Majesty, however, has made it optional with the sellers and buyers to make use of the old or new weights and measures until the 1st of January, 1863, after which time the new weights and measures are alone to be used.

SWEDEN (GOTTENBURG).

EXTRACT from the Report of Mr. Consul ENGSTROM, on the Trade of Gottenburg for 1854.

THE trade of Gottenburg during the year 1854 has, on the whole, been fully equal to that of the preceding year, and, according to the report of the merchants, the result has been very satisfactory.

In the article of iron there has been an increase of 600 tons on the export of 1853, the shipments having been as follow, namely:

In 1854.	Tons.	In 1853.	Tons.
To Great Britain . .	18,550	against . .	20,400
To America . . .	7,700	„ . .	4,800
To other Countries . .	4,450	„ . .	4,900
Total Tons . .	30,700	. .	30,100

The present stock on hand is unusually low, 4,550 tons only, being above 6000 tons less than in 1853.

The shipping price for ordinary iron, free on board, has advanced from 11*l.* to 11*l.* 5*s.* per ton in 1853, to its present rate of 13*l.* 5*s.* to 13*l.* 10*s.*

Freight of iron to London, 10*s.* to 15*s.* per ton.

The export of wood from Gottenburg has been somewhat less than in 1853.

Of planks, deals, and battens, the shipments have been as follow, namely:—

In 1854.				In 1853.
128,500	dozens to	Great Britain,	against	177,800
14,100	„	British Colonies,	„	..
29,000	„	France,	„	43,600
7,000	„	Belgium,	„	9,800
36,400	„	other Countries,	„	26,650
215,000	Total dozens.		„	257,850

Of other descriptions of wood:—

18,000 pieces of square timber and balks.
3,400 pieces of masts and spars.

The present current prices of timber and deals are—
Square timber, per load of 50 cubic feet:—

	£	*s.*	*d.*
9 to 13 inches square . . .	2	10	0
5 to 8 „ . . .	1	17	6

Deals, St. Petersburg standard of 165 cubic feet :—

	£		£
1st quality, mixed red and white . .	11	to	12
2nd „ „ . .	10	to	11
3rd „ „ . .	8	to	9

Looking at the excess of importation into England in 1854, and the very extensive stocks of wood remaining over in the London market, especially colonial deals, of which there is much more than sufficient for a whole year's consumption, a decline in the export from Sweden during the ensuing year may be looked for.

The shipments of grain from Gottenburg in 1854, consisted of—

Wheat . . .	about	6,000 quarters.
Rye . . .	„	25,000 „
Oats . . .	„	60,000 „
Other kinds . .	„	4,000 „
Total . .		95,000

of which, about 65,000 quarters went to England.

The total exports from Gottenburg this year may be estimated at 700,000*l.* being equal to those of 1853.

The imports into Gottenburg in 1854, consisted principally of—

Cotton	about	11,000,000 lbs.
Cotton yarn	„	2,400,000 „
Coffee	„	3,500,000 „
Hides and skins . . .	„	2,000,000 „
Raw sugar	„	14,500,000 „
Tobacco	„	2,250,000 „
Spices	„	140,000 „
Wine of all kinds . .	„	80,000 gallons.
Coal, British . . .	„	38,000 tons.

The following are the current prices of these articles :—

Duty paid.	*d.*		*d.*	
Cotton yarn (British) water bleached, No. 30 .	15	to	16	per lb.
„ „ mule unbleached, No. 36 .	14	to	15	„
Cotton, North American	5¾	to	6	„

	d.		d.	
Coffee, Java	8¼	to	8½	„
„ Brazil	6	to	6½	„
Hides	9½	to	12	„
Sugar, raw, Brazil	4½	to	5	„
„ Havannah	5	to	5½	„
Tobacco, Kentucky	9	to	9½	„
Coal, British	25*s.* to 30*s.* per ton.			

The total value of all imports into Gottenburg in 1854 may be reckoned at 1,250,000*l.* being 250,000*l.* above that of the preceding year.

The importation of raw cotton into Gottenburg is rapidly extending, the quantity in 1854 having exceeded that of 1853 by 4,000,000 lbs., and being more than double that of 1852.

About 4,400,000 lbs. have been consumed this year by the spinners in this neighbourhood.

Notwithstanding this progress in advance in the consumption of cotton, the supply of native yarn does not keep pace with the demand, as appears by the increased importation of British cotton yarn in 1854, which exceeds that of the preceding year by nearly 1,600,000 lbs.

The consumption of raw sugar for refining at this place has advanced from 10,000,000 to 11,000,000 lbs. in 1853, to about 13,500,000 lbs. in 1854.

Of British coal the importation into Gottenburg in 1854 has exceeded that of 1853 by 3000 tons.

The amount of British shipping employed in the trade of Gottenburg this year has been somewhat below that of 1853.

The total number of vessels, including 50 voyages of steam-traders between Hull, London, and Gottenburg, was 166, with an aggregate of 36,038 tons.

The tonnage of the Swedish and Norwegian shipping amounted this year to 103,408 tons.

The merchant-ships belonging to the port of Gottenburg are at present 147 in number, having an aggregate tonnage of 35,500 tons.

In the new tariff, which comes into operation on the 1st January, 1855, an approach towards free trade is observable. Prohibitions are for the most part removed, and some important reductions of duty on a variety of articles, both of import and of export, have taken place.

This change, combined with the facility afforded by regular steam-boat communication between the ports of Hull and Gottenburg, will doubtless tend to an extension of the trade in British manufactures.

Various measures of internal improvement have likewise been passed at the last Diet, among which may be noticed a grant of money for the extension of railroads, especially of the line between Gottenburg and Stockholm, and an Act for regulating the weights, measures, and money of the country according to the decimal system.

Money has been abundant and at moderate rate of interest throughout the year,—indeed, the private banking establishment of Gottenburg, by its judicious management, affords great security and facility to financial operations.

The present population of the town of Gottenburg amounts to 23,822 against 20,717 in 1849, being an increase in the last 5 years of about 3,100.

SWEDEN (STOCKHOLM).

Extract from Report of College of Commerce of Stockholm, upon state of Manufactures, &c., in Sweden, in 1853.

The number of factories in Sweden in 1853 was 2,456, employing 22,895 workpeople; an increase of two factories and 250 workmen on the preceding year. In the weaving factories there were 2,758 looms in work, 130 less than in 1852, exclusive of manufactures at the machinery works at

Motala, valued at 503,937 rix-dollars banco; the total value of manufactured goods produced in 1853 amounted to

	rix-dollars banco	24,875,374
In 1852 to		24,213,771
Increase in 1853 . .	rix-dollars banco	661,603

This increase may chiefly be attributed to the greater activity shown this year by the cotton yarn and cotton weaving mills, tobacco factories, and paper mills.

The amount of taxes paid by the different manufacturers in the kingdom, on account of their business in 1853, amounted to the sum of r.-bco. 41,330 6 sk. 6 rat., less by r.-bco. 1,609 17 sk. 6 rat. than the amount paid by them in 1852.

As regards "Home Manufactures" (by peasants in their own houses), amongst which weaving takes the principal place, as far as can be judged from the imperfect returns sent from the different provinces, a considerable increase upon the year 1852 is found, especially in woven cotton goods.

In the cloth-making districts the manufacture of cloth, of a middle quality, has exceeded that of the past year by an amount of 30,179 ells, whilst, as regards fine and coarse cloth and woven woollen goods, such as shawls, blankets, table cloths, &c. it is less than the preceding year, 184,994 ells and 3,710 pieces. The entire value of cloth manufactured in 1853 is less than that of 1852 to the amount of rix-dollars banco 647,618.

The sugar refiners, 17 in number, produced 16,137,548 lbs. of sugar of different qualities, and 5,139 lbs. of treacle, valued together at rix-dollars banco 4,802,874.

10*th February*, 1855.

SWEDEN.

EXTRACT from Report of College of Commerce of Stockholm, on Trade between Sweden and Great Britain during 1853.

DURING the last five years, the average value of goods imported into Sweden from Great Britain and Ireland, did not amount to quite 4,000,000 rix-dollars banco, and in the year 1852 amounted to 4,541,000 rix-dollars.

Through the cessation of the system of diminution of duties on produce imported direct from the colonies, and the consequent increased importation of colonial produce from England, and a greater importation of cotton, coal, and machinery, the value of the imports for the year 1853 rose to the sum of 5,673,000 rix-dollars banco, which is the greatest amount they have attained in any year.

The above importations were effected by 466 Swedish vessels, to the amount of 1,872,000 rix-dollars; 50 Norwegians, for 320,000 rix-dollars; 134 British, for 3,239,000 rix-dollars; and for 242,000 rix-dollars by 2 Finnish, 8 Prussian, 7 Danish, 3 Mecklenburgh, 6 Hanoverian, and 3 Dutch vessels.

The value of exports, which in 1843 amounted to 3,705,000 rix-dollars, in 1851 rose to 10,344,000 rix-dollars; in 1852 fell to 10,036,000 rix-dollars; in 1853 amounted to 14,186,000 rix-dollars; added to which 1,379,000 rix-dollars coined money was sent to England in 1853. Of the above, the value of 7,570,000 rix-dollars was exported in 617 Swedish; 2,646,000 rix-dollars in 492 Norwegian; 4,823,000 rix-dollars in 258 British; and 526,000 rix-dollars in 11 Finnish, 2 Prussian, 32 Danish, 9 Hamburg, 21 Hanoverian, 5 Dutch, 1 Belgian, 1 French, and 1 Spanish vessels.

The number of Swedish vessels employed from foreign ports to England in 1849 was only 28, of 2,088 lasts, and increased in 1853 to 271 vessels, of 25,039 lasts. In 1852

there entered British ports 614 Swedish ships, of 52,523 lasts; and in 1853, 1,320 ships, of 100,283 lasts burthen.

In the year 1853, 12 Swedish ships, of 1,396 lasts, were sold in England.

The increase of Swedish commerce with Great Britain and Ireland was so great in 1853, both as regards the number of vessels so employed, their tonnage, and the value of their cargoes, that it is difficult to compare this year with those preceding it; though 1852 showed a great increase, yet it is far surpassed by 1853. In the former, 400 Swedish vessels of 29,673 lasts arrived in British ports from Sweden; in the latter, 588 ships, of 41,229 lasts; an increase of 188 vessels, of 11,555 lasts; the value of the cargoes exceeding those of the preceding year by about 280,723, or nearly the double.

The exports of wood to Great Britain in 1853 were considered to be the greatest yet known.

SWEDEN (STOCKHOLM).

Extract from Mr. Consul Pringle's Commercial Report on Stockholm, for the year 1854.

The greater portion of last summer and autumn was particularly fine, and favourable for agricultural labour, consequently the crops of all descriptions promise well, notwithstanding which the price of grain, of butcher's-meat, and provisions, generally maintain a very high price. This in some degree may be accounted for, as regards the price of cattle, by the loss sustained of animals in 1853, but in other articles of consumption it is somewhat difficult to allege a reason, except that, last summer, in anticipation of a large supply being required for the use of the Allied Fleet in the Baltic, traders raised their prices in many cases 50 per cent., and in very few instances have they been again reduced. In the article of grain, the present high prices may be, in some

manner, accounted for by the unusual large quantity of all kinds imported during the year 1854, which has reached in amount to about 570,000 English quarters. This, it appears to me, becomes a serious question for Sweden, on account of the danger which might occur from a scarcity of cereal production.

I venture to think that 400,000 acres of unimproved land (and capable of being cultivated) must be brought into use, and a very different system of agriculture adopted by the *bandi*, or peasant-farmers of the country. By precept and example they must be disabused of their old prejudices by their superiors in intelligence and knowledge; they must be convinced that in this country, where time is of so much value, it is their interest to make use of horses instead of oxen for all agricultural labour; they must drain their land, and make available all modern improvements before Sweden (by these means doubling her produce) can afford to become an exporting country.

Brandy Distilling.

From the resolution of His Majesty that two months in the year only should be set apart for the distillation of brandy, and also a considerable additional tax put upon the sale of this spirit, it was hoped that much benefit would arise from these measures, but I fear they have not been realized. Illicit distillation of brandy goes on to an alarming height, and smuggling from other countries is very prevalent. To put an end to both of these evils would be a most difficult task, as from the nature and extent of coast on the one hand, and the facility with which illicit distillation can be carried on in the interminable forests of the country on the other, it is difficult to imagine any amount of preventive power sufficient to master the evil.

A very curious fact prevails in Sweden connected with the use of brandy.

A male criminal is condemned for some crime to lose his

head; on the way to the place of execution, he is allowed to stop at a certain public-house where brandy is sold, and he is supplied with a glass of what (to the last) is esteemed by him as a great consolation, and what, in all human probability, has paved his way to the block. This ceremony has taken place more than once since my residence in Stockholm.

Animal Food.

A very small quantity of animal food is consumed by the inhabitants of Sweden. The middle and lower classes subsist very much on fresh fish in summer, and on dried and salted fish in winter. The numerous lakes in the country are full of fish of various kinds, more particularly of pike and tench, which grow to a very large size in the different lakes.

These classes consume a great quantity of rye, oats, and barley, in the shape of bread, puddings, soups, and gruels.

In Stockholm, with 93,000 inhabitants, about 9000 bullocks are killed in the year. An immense quantity of extremely bad butter is used, nothing of any kind is cooked without it, and it appears that butter and the fat of animals are essential as food for the inhabitants of a cold country; and I have seen, even in Stockholm, a horse with a ticket attached to him, letting the passengers know that the animal was to be slaughtered at such an hour, and the meat disposed of at so much per pound,—about 2*d.*

The breed of oxen in this country is for the plough; no store of animals is kept and fed for the butchers; the consequence is, the meat is lean and bad. I consider it quite impossible to look to Sweden for a large supply of bullocks for any emergency which might occur. Vegetables, with the exception of potatoes, are scarce and bad. Potatoes are in general plentiful, and of a good quality.

Trade during the year was not so extensively carried on in general as in 1852–3; but in the Gulf of Bothnia to Happaranda, and other ports on the Swedish coast, trade was

carried on to an extent unprecedented in former years. Six large steamers were running the whole summer and autumn, deeply laden every trip with goods, which were landed at Swedish ports, and soon afterwards carried across to the Finland coast.

The articles exported from hence were chiefly sugar, salt, coffee, and tea, all of which brought immense prices in Finland, and induced vessels to run almost any risk for the sake of the gain, one merchant having got 10,000 rix-dollars, about 550*l.*, for one freight to Happaranda; during the whole of the winter an enormous quantity of Russian goods having been brought from the interior, purchased by Swedish merchants, and received at Happaranda, ready to be shipped from thence, and at the ports, such as Umea, Pitea, &c., next open water. I was told that some days, during winter, as many as 801 horses with sledges have arrived at Happaranda, loaded with goods for the above purpose.

The number of British vessels trading to Sweden was 251, with a burthen of 56,358 tons.

The value of imported articles from Great Britain was 472,750*l.* in 1853.

The value of exported articles to Great Britain was 1,297,083 in 1853.

The value of goods of all denominations manufactured in Sweden during the year 1853, was 2,072,947*l.*

There are, according to a biennial return given this past year (1854), 1,414 merchant-vessels, with a tonnage of 172,404 tons. There are 82 steam-vessels of from 20 to 140 horse-power, which carry goods and passengers on the Baltic, and Mälar, and other lakes.

In the year 1854 there were in Stockholm 2,611 births, of which number 934 were illegitimate.

During the same year 3,535 persons died;—amount of deaths greater than births 974.

The crime of child-murder seems to increase, and in like manner the crime of robbing the public post on the high-way.

To account for the prevalence of the former, the utter want of protection by law which the female has, may be stated as one principal cause.

The oath of the woman is not admitted against the man. She must prove by two credible eye-witnesses the fact. The high sum demanded (100 bancos) for the admission of the child into the asylum is a second cause. These and other circumstances will, in some measure, account for the amount of this crime, when in a prison set apart for female culprits, containing 370 prisoners, 109 of them were for child-murder.

To account for the frequent occurrence of robbing the mail, it may suffice to state, that the mode in which the public letters are conveyed is in a low cart of the country, which travels at the rate of towards five English miles per hour; the small ponies are generally driven by a lad, accompanied by the guard armed with a sabre.

The roads in Sweden are impeded by gates, which mark the division of property, all of which gates must be opened by the guard, and it is generally near to one of these gates where the robber lies concealed for the purpose of firing at the guard when he is opening it.

The money contained in letters is sometimes to a very great amount, for this simple reason, that supposing a merchant in Stockholm wishes to transmit to a house in Gottenburg, or any other town in Sweden, 500 bancos or 50,000 bancos, he sends the whole notes by the post, receiving at the post office (by paying a very trifling postage) a receipt for the sum, for which sum the Government is answerable. In this way millions of banco dollars are traversing the land every day. Two individuals are now under sentence of death for robbery and murder of the guard, committed a few weeks since.

20*th March*, 1855.

TURKEY (BEYROUT).

Mr. Consul Moore's Review of the Trade of England with Beyrout, in the year 1854.

Imports.

The following comparative statement of British vessels, tonnage, and value of cargoes, arrived at Beyrout during 1853 and 1854, shows an increase in the trade of England with Beyrout in the latter year.

1853	39 vessels,	8,546 tons,	value	£225,876
1854	57 „	15,392 „	„	£260,716

The arrivals in 1854 include 21 vessels with coals, which have landed 6,916 tons, for the use of the French and Austrian steamers touching at Beyrout every week, keeping the lines between Marseilles and Trieste with the Levant, Syria, and Egypt.

The sum of 260,716*l.* (namely, 136,154*l.* for goods conveyed by screw steamers, and 124,562*l.* by sailing vessels), only represents the value of that portion of cargoes landed at Beyrout; the remainder, nearly as much, being destined for the north of Syria, and is always landed at the port of Alexandretta, making the total value of British imports to Syria upwards of 500,000*l.*

The gross return of the trade shows a marked progress in the internal and foreign trade of other countries with this port, during the past year. This increase is attributed to a more frequent steam communication between Europe and the several ports of the Turkish dominions, as well as to an improvement in and encouragement to agriculture in Syria, which has favoured the exports, thus providing proportionate facilities to foreign imports.

Exports.

The 29,833*l.* shown on the returns, as the value of goods exported from Beyrout to England in British vessels during 1854, chiefly represents the silk reeled at the two English filatures established in the Lebanon, and conveyed by English screw steamers to Liverpool.

Of the number of ships arrived at Beyrout from England with outward cargoes, 32 sailing vessels have loaded wheat, barley, and other seeds for Great Britain, at the several ports in Syria, the island of Cyprus, and Caramania. The screw steamers took part of cargo at Alexandretta and Beyrout, consisting of wool, madder-roots, tobacco, &c. A greater number of cargoes of corn was shipped to the United Kingdom in 1853, as in 1854 a considerable quantity of wheat and barley was sent from Syria to Constantinople and the Crimea, for the use of the allied armies.

Athough the trade with England had greatly decreased in the early part of 1854, yet in the latter part of the year, the harvest having been favourable, the import trade received a fresh impulse and exceeded that of 1853.

This improved condition of the import trade from England still continues, and an unusual number of English vessels, loaded with Manchester cotton goods, have already arrived at this port; no less than 17 vessels, of considerable tonnage, are announced to have left Liverpool for Syria almost simultaneously.

This unprecedented increase of importation, combined with the prospect of a favourable harvest throughout the country, justifies the expectation, that the trade of England with Beyrout during the present year, will surpass that of all preceding years.

30*th April*, 1855.

TURKEY (BRUSSA).

Summary of Report from Mr. Consul Sandison on the Local Administration and condition of the people of the District of Brussa, for the year 1854.

The crops having turned out favourably, considerable relief was thus afforded to the labouring classes, and both skilled and rural labour yielded high wages.

Many of the ordinary necessaries, such as bread, wood, charcoal, oil, &c. doubled in price; meat, however, remained cheap.

The distress was considerably alleviated amongst the Rayas by their various resources for employment, especially that in silk filature, which is now established to a considerable extent, and affords great aid, furnishing employment to upwards of 2,200 young women, who can thus contribute to the support of their families.

The Armenian quarter of the city, which was burnt some time since, is about to be rebuilt upon a new plan, which will be a considerable improvement.

A part of the Shio road, which has been completed, is found of the most material benefit; and the speedy completion of the whole line, it being the only means in the winter of communication with the coast for steam transit to the capital, is greatly to be desired.

The country is healthy and very quiet, and a good police has been established.

TURKEY (BRUSSA).

Report of Mr. Consul Sandison, on the Trade in the District of Brussa for the year 1854.

Imports.

After a most prolific season for silk cocoons, with fair grain crops and high prices for such products to augment the

resources of the population, the demand for Import articles became unusually animated from the month of July; all the goods sent to the fair of Balukissar, held in September, went off satisfactorily, and through the season the dealers had never found the ready sale for their stocks surpassed, according as they were enabled to renew them from the Capital.

There the importations, owing to the state of war, had been very scanty, otherwise the trade here would have been more extensive in its principal branches.

Of British cotton manufactures, various articles were wanting, or in slender supply, which would have found a ready market. The quotations in the Prices Current will indicate the rates obtained, and to which are annexed some remarks for further information.

One description of Manchester goods, ranking first-rate in point of consumption, I regret to find sent out so deteriorated as to bring them into great discredit.—These are blue prints or printed calicoes, of 28 yards, which now come here only of the most flimsy texture, and open when exposed to the light as gauze or sacking. Such as they were, the consumers had to purchase, being unable to dispense with them, and no French prints having come to supply the deficiency.

Other wove articles, colored and white, maintained their relative station in point of demand, as also our cotton yarns.

For Colonials the consumption here is not considerable. Coffee and sugar, the principal articles, went off in fully the usual quantities, or more, without much variation in price.

Continental cotton manufactures did not figure much, the supplies being almost exclusively confined to printannières, a species of nankeens, and imitations of Brussa stuffs, of the value of 4½*d.* to 6*d.* per yard.

Woollen cloth, French, German, and Belgian, shared in the demand, and found current sale.

Exports.

Silk commanded good remunerating prices throughout, without any lack of purchasers on account of the extraordi-

nary supply. The highest rates obtained were 14*s.* 6*d.* to 16*s.* 1*d.* per lb. for the finest native reels, and for the rest from 14*s.* down to 8*s.* 9*d.* per lb. according to the descending scale of the species, and current value at the time; none of the silks wound off in the regular filatures are sold to speculators here, unless very rarely, but sent to the Export markets for account of the owners. But little of those go to England, and of the rest about one-fourth, it is computed, through Constantinople; the remainder is shipped there for Marseilles.

Cocoons have become of larger and extending sale, from the increase of local filatures, and occasional purchases for export. The shipments this last season were increased to 13,200 bushels, and the prices for internal use always favourable to sellers, who obtained equal to 10½*d.* to 1*s.* 6*d.* per lb. for fresh cocoons, according to quality, and course of the market.

It is affirmed, that never within memory, and with production in the meantime increased, has there been such a large gathering of cocoons as this last, in good order also, as is the invariable accompaniment of the worms finishing their toil in a healthy state. There still remains some quantity, as likewise of reeled silk, unsold; and no returns have been made up, which only takes place at the end of March, O. S. But by an approximate estimate derived from competent sources, the aggregate product of cocoons would amount to 4½ millions of okes, nearly 13,000,000 lbs., equal to a yield of 6000 bales of 1k of 170 lbs. each, or 1,020,000 lbs. in all.

Of this, it is computed, about 150,000 lbs. will be wound off by the local filatures, which are rapidly augmenting in number. There are now at work eighteen large establishments of the kind, with one more in progress, the principal employing from 80 to 120 reels, of which magnitude there are four—the rest are furnished with 40 to 70 reels; in addition to which, there are seven small filatures with 8 to 24 reels each. Of the major establishments, and comprising the

four already described, there are fourteen in this city, and five small at Mundania, two major filatures at Bilizik, two more, and one small, and one more small filature of 12 reels at Lefghi.

About four-fifths of the product of those filatures go to France, because each grade of quality is of easiest sale there, which is only sure in England for the best—whence only the remaining one-fifth is sent there.

The chief exporter to England associated with another native merchant, and a merchant at Constantinople, by birth a British subject, inform me that they have, this season, extended their concerns in filatures, so that they may furnish two-fifths of their total product; and their finest sorts after fetching as high as 27*s.* were still selling at 25*s.* per lb. in London, where they rank next after the silks of Novi, which are the first class of all. For the rest of the filature silks from hence, the value had varied down to 22*s.* per lb., whilst only 17*s.* could be obtained for our finest native reels according to the common method, and bearing the name of Demirdesh, from a village where produced in this vicinity.

It being evident from the continuous increase of filatures, that they offer great inducements for the investment of capital, and have been yielding large profits: the appearance is that they will, with time, almost entirely supersede the home reeling by the natives, who may save time and labour, by disposing of their cocoons at once to equal advantage nearly with the silks they produce.

Still, in years when China can pour in vast supplies into Europe, and reduce the value of the article to the lowest scale, they are exposed to most prejudicial or ruinous competition, from their silks and cocoons being loaded with 10 per cent. of tithe—now levied exactly ad valorem on both—and 12 per cent. more of customs on exportation. In times of high prices this is not felt, because in reality a deduction from profits, and of which the tithe paid down is alone perceptible, or intelligible to ignorant peasants.

Other usual Export trade, which concerns this district,

has not during the past year afforded much scope for notice.

About 200 tons of valonia were sent in small craft from Panorma to Smyrna, none shipped direct for foreign ports.

The clip of sheep's wool was insignificant, owing to the previous disease and mortality among the sheep.

According to advices from Angora, the like ravages there had been so destructive among the goats, as to sweep off, it is affirmed, four-fifths of their number. And a very considerable diminution is to be expected in the supply of goats' wool from thence this next season, so that it may not exceed 4,000 to 5,000 bales. All last year's went to England from Constantinople—none from Ghio, where no vessel cleared out foreign bound with merchandise.

The opium product was further a failure at Kanahissar, the chief district whence it comes; mainly from droughts having parched the poppy plants.

Some shipments of chrome were made from Ghio to the capital, but to no great extent, of which I have not the particulars. At Constantinople it passes into the hands of a foreign house named Giustiniani, under some contract, or other arrangement with the Porte.

The wines of Brussa have not succeeded on trials made by the principal manufacturer, to suit foreign markets, unless partially at Odessa. It appears they could not bear the distant carriage to England.

A new branch of export trade of considerable importance has been opened, by the supply of live stock from this district for the Allied Armies in the Crimea,—about 2,600 head of cattle were sold in the summer to the British Commissariat, part delivered at Scutari; the rest, placed in keep in this vicinity as a reserve, are being successively removed in transports from the port of Ghio to the Crimea.

More recently, 3,000 to 4,000 head of cattle were purchased for the French Army there, with 4,000 to 5,000 sheep —the latter to be taken from Ghio—the cattle in course of shipment from Panorma.

Further quantities of this live stock, of both kinds, may be procured in this quarter, and are likely to follow for the same destination, provided the winter season sets in, and state of the roads for communications permit, on which such operations will greatly depend.

The local manufactures of this city and district have proceeded much in the usual course. Of the silk and cotton stuffs called Hakirs, Cutnis, &c., of 7 yards, there were made last year 14,500 pieces, used only for internal consumption.

In the Turkish currency there is, as before, a considerable disparity between paper notes and the common metallic money, the latter bearing a premium of 20 to 25 per cent., not owing to the paper being in any discredit, but because it scarcely passes in the provinces, except here, and the coin is absorbed for their wants, whilst also required for the general payment of the taxes, without any of the like money having been issued from the Mint for years, to meet the drain and waste. For it is too debased to be exported, to the certain loss of the greatest portion of its current value in the country, and for the same reason is unfit to be hoarded, instead of good coins of stable value, which can always be purchased with it for the purpose.

The course of the foreign exchanges at the Capital being on the rise, as calculated in piastres, and up to 139½ piastres per pound sterling for bills,—the coined sovereign, hitherto passing at 140 piastres, whilst the rate for bills was varying from 131 to 136, is now likely to exceed the advanced rate in the same ratio; and all foreign specie rise in proportion.

All attempts to limit its exchangeable value by Edicts and Regulations have ceased, since the issues of specie brought out for the service of the Allied Armies, the circulation of which could not be fettered. Those restrictive measures only created a serious public grievance, but never did, nor could, limit the course of foreign coins to arrest the depreciation of the piastre, when based only on a metallic circulating medium, of which 250 piastres or more, are required to yield the par in pure silver of a pound sterling; and

whilst such is the case, to that level the nominal piastre is sinking, with a descent, though slow, as sure as that of the melting snow into the ground.

The precarious nature is thus obvious, of time engagements in Turkish currency being exposed to fluctuations often sudden, which are ruinous to individuals as to trade, the loss falling generally on the Import merchant who sells on credit.

Some project of reform, by means of a Bank, which was to call in the paper notes, and debased coins, and keep the exchanges steady, has been dropped in the course of the war. The plan, never fully developed, seems to have been very defective; since, a good metallic circulating medium, without paper, should maintain the equilibrium of the exchanges of itself, for which the Banking Company was to be largely paid by the Porte.

Regulations in Trade. On this head there has been nothing of novelty, save the subjecting purchases of grain to certain restrictions, in order to preserve sufficient local supplies. But after the recent measure of the Porte, declaring the trade and export entirely free, I have not heard of anything in contravention having taken place.

The amount of capital of British subjects now engaged in filatures, and other branches of trade in the district, is become more considerable, and may not be under 50,000*l.* to 60,000*l.* There is, however, no accession of British mercantile houses—confined to one commission agent, whose business is very limited. The deficiency is not for want of an ample field for any connexions of capitalists at home, whose transactions might embrace silk purchases jointly with those of other products of Asia Minor, for which this can be a convenient inter-medium of exportation. Were there facilities for the direct tenure of landed property by British subjects, few places could offer more eligible resources for enterprise in filatures, the rearing of silkworms, connectively or apart, and various other establishments, for which abundance of water is favorable.

Of French mercantile houses, there are three, if one, from the special nature of its business, can rank as such.—There are besides, various French subjects settled here as directors of filatures, or otherwise connected with them.

Brussa, 11th January, 1855.

TURKEY (BRUSSA).

Extract from the Agricultural Report of Mr. Consul Sandison, for the District of Brussa, for the year 1854.

My Quarterly Reports have already notified the abundant yield of the grain crops, where they escaped attack from locusts, so as to have turned out favourably in the aggregate.

Towards Smyrna, however, throughout the Sangiak of Balukissar, the locusts had caused great destruction, whence the wants and demand for grain were spread over the wider surface. On the other hand, the high rates at the capital necessarily equalized prices, keeping them at a very elevated level, to the great advantage of the growers here.

The favourable nature of the season was common to almost all products of the soil. Olives, sesame, and tobacco, amongst others, rendered copiously. Grapes formed a special exception, owing to the further spread of the prevalent disease of the vines, to which they would appear to be everywhere subject. The price of grapes for making wine and other uses, rose, during the season, from 50 to 70 piastres the load of 100 okes; equal to 7*s.* 6*d.* to 10*s.* 5*d.* per 280 lbs.

Of *Olives,* the gathering, still incomplete, is most plentiful, equal to any for a good number of years, and estimated at 15,000,000 of okes, nearly 45,000,000 lbs., in the district along the coast from the head of the Gulf of Mundania westwards. From the suspension of the trade with Russia (a principal market for salted olives) it is likely that a much larger portion of the product than usual must be converted

into oil. But the process, in which the people here are not expert, requires to be improved to render it fit for exportation. There are also but few presses for the purpose.

Of *Potatoes*, the culture, confined to the vicinity of Brussa, was there extended, and is gaining favour with the peasantry. Much of the soil in this plain being light and sandy, yet sufficiently rich for such crops, without much need of manure, is admirably adapted for its production; and the quality was last season excellent, as usual. With the excessive dearness of bread, the inhabitants, particularly of the lower class, are beginning to make more use of potatoes cooked for their meals. They are also being ground by Europeans to intermix with flour from grain, which is liked, and sells on a par with the coarsest wheat-flour or better. The early price of potatoes in retail was 2 piastres the oke; and later, from that to 1 piastre, equal to $3\frac{1}{2}d.$ to $1\frac{3}{4}d.$ per lb. They have recently sold wholesale at $1\frac{4}{17}$ piastre, equal to $3d.$ per lb., probably for making flour; and at 1 piastre, equal to $5s.$ $10d.$ per cwt. when the crop is at all tolerable, are the most lucrative the cultivator can raise.

For the feed of live stock of all sorts, as horses, horned cattle, and sheep, the pasturage became abundant from the month of April, and so continued from after-grass in the autumn till the close of the year. The demand for ready cash for the supply of the allied armies with such stock, cannot have failed to awaken the attention of the peasantry to its importance, and most parts of the country afford plentiful means of raising it. But the common breeds of horses and oxen are stunted and defective, without any pains or means taken to improve them by crossing. And habits of negligence and improvidence in respect of winter keep are too deeply rooted to be easily overcome.

The experiment made by the Porte for the naturalization of the Merino breed of sheep, has, unfortunately, not been kept up to attain its object, and give a successful example of innovation as an improvement. Commenced by Riza Pacha, who, when at the height of his power, lavished large sums

on the enterprise, it only prospered whilst his protecting interest in it and influence lasted.

Preparatory cultivation for next crops has been prevented by continuous heavy rains during the autumn and winter, so saturating the ground, that it has remained almost wholly untilled and unsown. It is to be feared this may prove a serious misfortune, the remedy for the deficiency depending on spring labour, which can never be to the same extent, nor so suitable for all crops, as early culture.

15*th January*, 1855.

TURKEY (MONASTIR).

From the Report of Mr. Consul Longworth, on the Trade of Monastir and its Dependencies for 1854.

The general trade of this province, which, at the commencement of the year 1854, had been much depressed from various causes connected with the opening of hostilities, during the course of it gradually revived, and towards the close displayed unusual activity. The successes of the Turkish army on the Danube, and the prompt repression of the insurrectionary outbreak in the neighbouring provinces, have restored tranquillity and confidence. But the circumstance which has mainly contributed to the revival of trade, has been an abundant harvest, accompanied by a brisk demand of grain for exportation. Prices also have been very profitable, notwithstanding high export duties, and the expenses of land carriage, aggravated by the scarcity of beasts of burden, many of which have been pressed into the transport service of the army, while others, and more particularly those of the Wallachian carriers, had been plundered by the Bashi-Bazouks. Still it is calculated that more than 100,000 Imperial quarters of wheat have been exported from the Sandjak of Monastir alone.

These results are, on the whole, highly satisfactory, and no better proof is wanted that, in this country of all others,

the prosperity of commerce must have its source in that of agriculture. Nor does the activity which at the same time has prevailed in the different branches of native manufacturing industry by any means furnish an exception to the rule; since it is clear that if the furriers and the other manufacturers of country fabrics have been unusually busy for some months back, it is in great measure owing to the influx of money caused by the exportation of grain.

Returns, however, are only to a certain extent made in specie,—they chiefly consist of foreign manufactures and colonial produce, in the aggregate amount of which, during the last year, a marked and increasing proportion must be assigned to British imports. Manchester goods in particular have found a ready and extensive sale. Shirtings, calicoes, prints, madapolams, and cotton twist have been in great request; and at the annual fair of Luca, which is frequented by the merchants of Monastir, the competition among the buyers of those articles enabled them to dispose of their stocks both quickly and profitably.

I have, in my former trade reports, entered at length into the causes which have gradually established the superiority of British manufactures over the rival fabrics of Austria and Saxony. They have last year been favored by another circumstance. In anticipation of a suspended demand for Turkish imports, arising from war and domestic convulsion, the German manufacturers had extensively reduced their establishments and set limits to production. No such precautions had been adopted at Manchester, which, in addition to its customary imports here, has been able to meet the demand occasioned by an insufficient supply from other quarters.

The state of agriculture, for the reasons already assigned, should not be overlooked in an annual report of the trade of these provinces. Agriculture does not appear to have suffered much this year from the military conscription, which falls exclusively on the Mahomedan portion of the population, consisting in great measure of the inhabitants of towns,

while the agricultural labourers belong chiefly to the class of Rayahs. The tenure of land in this part of the country, is a subject of paramount importance, and from the considerations involved in it alone can we derive any reasonable hopes of material improvement.

The tenure which is most common here, is that of *Mulk*, or freehold property, which is, for the most part, held by Turkish Beys, and consists of *Tchifliks*, or farms of different size and value. The next in extent is that of Imperial domains, *Imlak*, which are farmed by capitalists or villages. The third sort of tenure is that of independent communities of peasant proprietors, called *Mustakil*.

Still, whatever the tenure of property may be, the conditions under which land is cultivated, would, if there were no oppressive exactions and abuses, be advantageous to the labourer. Where land is abundant and labour scarce, competition must be favourable to the latter. The terms therefore which the labourer nominally obtains from the landholder are very fair. The system is that of *Ortakgulik*, or partnership, corresponding with the continental *Metayers*. The proprietor, in addition to the use of his land and a cottage rent free, furnishes the seed; the labourer provides cattle and agricultural implements; the annual produce of the land, after the tithes paid to the government, is equally divided between landlord and cultivator; could these conditions be always observed, the latter ought undoubtedly to prosper; but the proprietor almost invariably contrives, through injustice and oppression, and sometimes through the improvidence of the labourer himself, to involve him in debt; and such is the usurious rate of interest, that this is always accumulating, so that the labourers, as a class, are in a general state of hopeless insolvency, which renders them virtually the serfs or bond-slaves of the proprietor. The benefit they might derive from competition in the actual state of the labour market is thus denied them: even among the villages called *Mustakil*, or independent communities of peasant proprietors, means are found, by the unjust distribution of taxes

(the wealthier landowners being comparatively unassessed) to crush their energies, compelling them to incur debt, and not unfrequently in the end, to part with their property and independence in order to satisfy the demands of their creditors. Debt and usury, indeed, is the incubus which weighs most heavily on the agricultural resources of these provinces, and the proprietor who avails himself of these means to plunder and enslave the labourer, is victimized in his turn by the capitalist, who profits by his sloth and prodigality to obtain possession of his property when payment can no longer be obtained from his revenue.

Property thus very often changes hands, but not in a manner calculated to make it more productive, or to benefit the labouring classes. The capitalists, who, by this process, acquire estates on which they cannot reside, make but indifferent farmers or landlords. These are consequently for the most part resold to the highest bidder, and there are at all times a considerable number of farms in the market. Land, therefore, is cheap, but it is a mistake to suppose that it can be had for nothing, though the price is such as, while yielding a fair return to capital, would enable the proprietor to act liberally by the labourer, whose debts, as a lien upon him (the nature of which I have before explained) it is necessary to purchase with the land he cultivates.

UNITED STATES (CINCINNATI).

Extract from Mr. Consul Rowcroft's Commercial Report on Cincinnati, for the year 1854.

The year 1854 has been remarkable principally for the failure of nearly all the banks doing business in this city; the same failures have taken place generally throughout the whole state of Ohio.

These failures have amounted in Cincinnati alone to more than 6,000,000 dollars. The failure of so many banks

has been aggravated by an unusual diminution of water in the river Ohio.

Duties on foreign goods are not assessed at this port, but at the sea-ports of New Orleans or New York, or other sea-ports.

The present high price of wheat in this district, the granary of the States—namely, 51*s.* 8*d.* per quarter—appears likely to be maintained; so that, at present prices, there can be little or no export of wheat from America to Great Britain.

The population of Cincinnati has not increased since the year 1854 in the usual ratio; this has been occasioned by a partial emigration further west, as well as by a diminution of immigrants.

15*th January*, 1855.

UNITED STATES (CALIFORNIA).

Report by Mr. Consul Aikin on the Trade of California, dated 6th January, 1855.

The export of gold dust amounted, according to the manifests at the Custom-house, to 51,500,000 dollars, equal to about 10,400,000*l.* sterling, of which about 9,000,000*l.* were sent to the United States; about 1,275,000*l.* to Europe and ports in the Pacific; and about 125,000 to China. This export shows a falling off from 1853 of about 700,000*l.*, but the decrease is accounted for in the improvements effected by local capital, and by the issue of coin from a local mint.

The exports of quicksilver amounted to 20,963 flasks, against 18,800 in 1853.

In the value of merchandise during the past year there have not been the extraordinary changes I have had heretofore to notice, the trade of the country having assumed a

steadier aspect. The increase in agriculture has been most marked, and the country now produces nearly as much of every description of grain as is required for consumption; prices, however, have not been high enough to remunerate the grower, and I look for a considerable decrease this year.

The following statement has been prepared with care, and may, I think, be relied on:—

Acres of Wheat sown 135,024
Average yield per acre 25⅞ bushels.
Quantity grown 3,439,533 bushels.

The imports of grain and flour have fallen off immensely, as appears by the following:—

	Barrels Flour.	Bags Wheat.	Bags Barley.	Bags Oats.
Imports in 1853,	498,740	80,186	294,065	104,914
Imports in 1854,	217,769	19,525	59,610	8,611
Excess in 1853,	280,971	60,661	234,455	96,303

The imports in 1854 were chiefly made in the first quarter of the year.

From Vancouver's Island we have received 3,301 tons of coals, and from Oregon 2,156 tons; the quality of each is inferior, and at present it is little used for steam purposes. The receipts from Great Britain are only about half of what they were in 1853, and the Steam-ship Companies have been compelled to burn hard coal received from the Atlantic ports of the Union.

The following are the imports of the principal articles received from Great Britain; a portion, however, has come to hand from the Eastern ports of the United States.

Beer, hogshead and casks	12,196
Beer, cases	16,197
Blankets, bales	1,927
Cement, barrels	10,207
Coals, English, tons	23,880
Hardware, casks	1,999
Hardware, cases	9,024
Hardware, packages	2,717

Iron bars, tons	47
Iron bars, No.	113,113
Iron plates	12,557
Iron, bundles and package	21,719
Iron, sheet, bundles	4,284
Iron, sheet, cases	184
Iron, pig, tons	82
Rum, puncheons	41
Salt, bags	12,235

The population of the State I estimate at 340,000 to 350,000 people; the increase in the year amounts to about 45,000, of whom 12,000 are Chinese.

The titles to land under Mexican grants are being rapidly settled by the commissioners here; it remains to be seen if the United States' Supreme Court will confirm their decisions.

About 100,000 people are engaged in mining, and the mines still yield abundantly: experienced miners continue to make good wages. Quartz mining is not carried on to any great extent, although private companies, on the whole, are doing well; of these there are registered thirty-four, with a capital of 248,000*l*. A far larger capital has been invested in canals and ditches. Six companies have carried water by diverting the mountain streams through 1,164 miles of country, at an expense of nearly 450,000*l*.

Ordinary labour at the mines has fallen to 16*s*. per day. Railways are talked of, but none have yet been actually commenced; there is, however, little doubt but that one or two will promptly be started. There is a good deal of European capital in the country, and investments are easily found for it on unquestionable security at from 24 to 30 per cent. per annum.

The value of merchandise passing through British hands may be estimated at 250,000*l*. I have issued five sailing letters for American and foreign vessels bought by British subjects. A few English vessels have taken the Chili and New Granada flags in consequence of the war.

Seamen continue to desert, but ships experience no difficulty in engaging fresh crews at from 4*l*. to 6*l*. per month.

There are now owned in and registered at this port 22 ships, 55 barques, 69 brigs, 247 schooners, and 181 sloops, measuring 52,739 tons: besides steamers, measuring 10,684 tons.

Ordinary labourers' wages have fallen to 16*s.* per day. Good mechanics receive from 24*s.* to 40*s.* Domestic servants, male and female, are scarce, and command 8*l.* to 12*l.* per month, with board.

AVERAGE Market Prices of Goods imported into San Francisco during the Year 1854.

		£	s.	d.
COALS.				
English	ton	5	12	0
Anthracite	„	5	4	0
Sydney	„	5	12	0
Vancouver's Island	„	4	0	0
PROVISIONS.				
Mess Beef	barrel	3	16	0
Prime Beef	„	2	16	0
Mess Pork	„	4	0	0
Prime Pork	„	3	0	0
Hams	lb.	0	0	9
Butter	„	0	1	4
Bacon, English	„	0	0	8
Lard	„	0	0	6½
Cheese	„	0	0	8
Salt, fine	„	0	0	1½
GROCERIES.				
Sugar, Loaf	lb.	0	0	7
Sugar, China, 1st ql.	„	0	0	5
Sugar, Manila, 2d ql.	„	0	0	4½
Coffee	„	0	0	8½
Pepper	„	0	0	3¾
Allspice	„	0	1	6
Cinnamon	„	0	1	6
Chocolate	„	0	1	9
Mustard	„	0	0	8
Ginger	lb.	0	0	9
Starch	„	0	0	6½
Soap	„	0	0	3½
Molasses	gallon	0	1	10½
Vinegar	„	0	1	0

		£	s.	d.
SPIRITS.				
Brandy, French	gallon	0	11	0
Do. London Docks	„	0	16	6
Gin	„	0	4	6
Whiskey, Scotch & Irish	„	0	9	0
Rum	„	0	8	0
WINES.				
Madeira	gallon	0	10	6
Ditto	dozen	2	11	0
Sherry	gallon	0	12	0
Ditto	dozen	2	16	0
Champagne	„	3	4	0
Hock	„	2	10	0
Sauterne	„	1	8	0
Claret	„	1	4	0
Port	„	3	8	0
BEER.				
Ale and Porter	dozen	0	13	0
Ale	hogshead	10	0	0
Porter	„	7	10	0
FLOUR.				
Chili, in bags of 200 lbs.		1	16	0
American	barrel	2	14	0
FRUITS.				
Almonds	per lb.	0	1	3
Raisins	per box	0	16	0
Brandy	per dozen	2	4	0

OIL.	£	s.	d.
Whale, crude, per gallon	0	4	0
Linseed..... „	0	4	6

GRAIN.			
Barley.... .....per lb.	0	0	0½
Wheat ..... „	0	0	1
Oats ..... „	0	0	1¼
Indian corn ..... „	0	0	1¼
Rice, China .. .. „	0	0	3
Rice, Carolina ..... „	0	0	3

TEAS.			
Green .....per lb.	0	2	0
Black ..... „	0	1	10

CEMENT.			
English ..... per barrel	1	16	0
American .... „	1	4	0

HARDWARE,
Assorted 40 per cent. advance on invoice.

IRON.			
Pig .....per ton	8	0	0
Sheet ..... „	23	0	0
Bar ..... „	17	18	4

CORDAGE.			
American, tarred, per lb.	0	1	0
Manila	0	1	0

DRY GOODS.	£	s.	d.
Sheetings, brown, 3-4 ...	0	0	3¼
Sheetings, do. 4-4	0	0	5
Sheetings, do. 5-4	0	0	5¾
Drillings, heavy brown, 30 in.	0	0	5
Cotton Duck, Nos. 1 and 5	0	1	4
Cotton Duck, Nos. 6 and 10....	0	0	10
Blankets, 20 per cent. advance on invoice			
Carpets, Brussels, per yard	0	12	6

NAVAL STORES.			
Pitch .....per barrel	0	16	0
Tar ..... „	1	4	0
Resin.... .. .. „	0	14	6
Spirits of Turpentine per gallon	0	12	0
Chains and cables per lb.	0	0	3½

Charcoal	2	8	0
Coke	2	0	0

COPPER.			
Sheathing ..... per lb.	0	1	6
Bolts .... „	0	1	5
Sheathing, yellow „	0	1	3

AVERAGE Market Prices of Goods exported from San Francisco during the Year 1854.

Gold Dust.....	per ounce	£3	10	0
Quicksilver	per lb.	0	2	0

VENICE.

REPORT of Mr. Consul-General HARRIS, on the Trade of the Port of Venice for the year 1854.

THE commerce of Venice during the year 1854 has not been so flourishing as those preceding; the scarcity of shipping, high rates of freight, over-speculation in grain